Rock Products

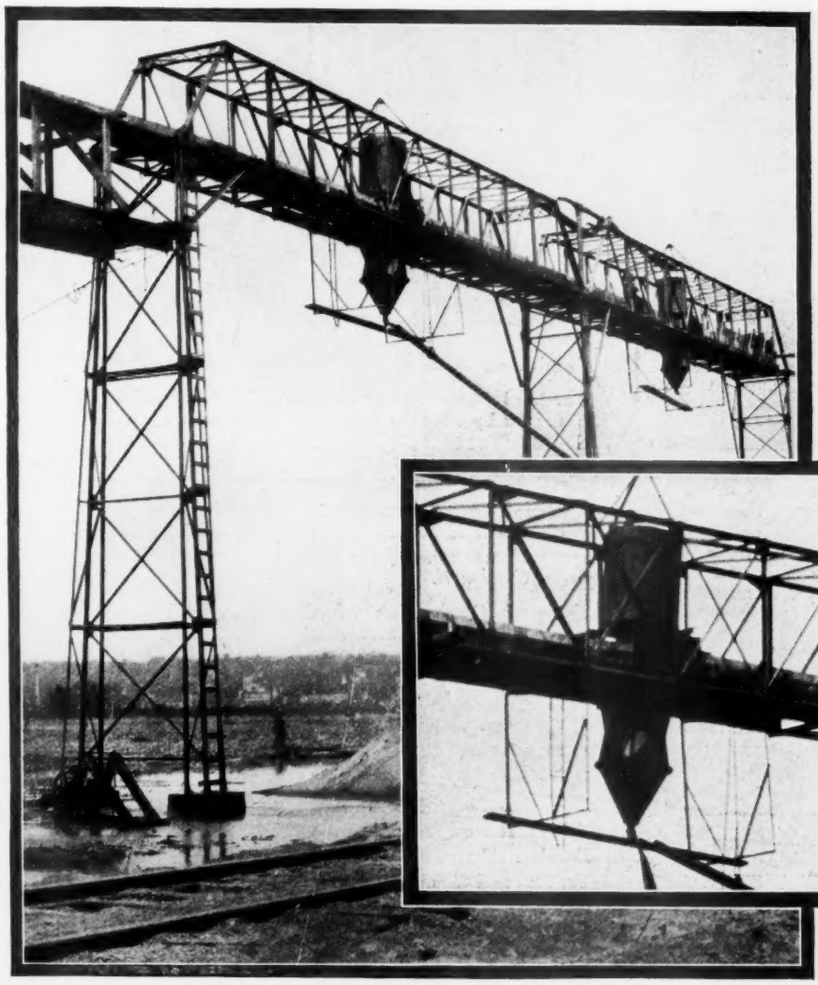
With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Chicago, February 1, 1930 (*Issued Every Other Week*) Volume XXXIII, No. 3

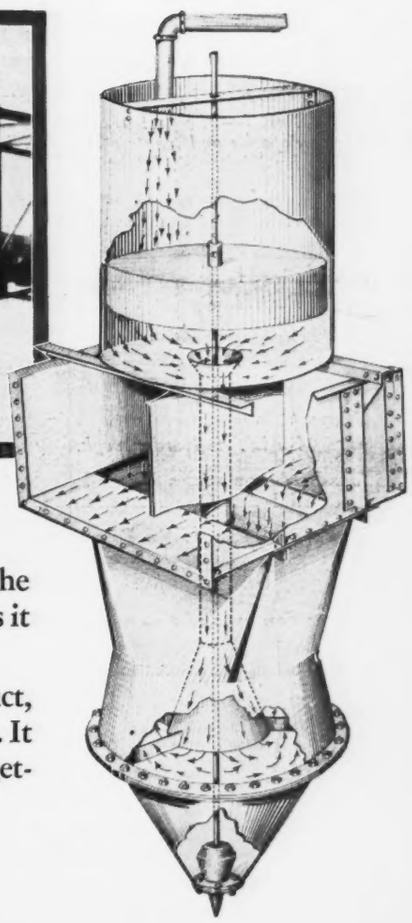
MEMBER A. B. C. *The Largest Paid Circulation Covering The Rock Products Industry* MEMBER A. B. P.

6000 Copies, Net, printed this issue

Clean, Accurately Graded Sand



These two Shaw Classifiers have enabled this producer to pass his state highway inspection in both grading of sand and silt content. Before the classifiers were installed many cars were rejected.



ONE of the most important parts of a washing plant is the sand classifier. A poor one may spoil material as fast as it is prepared.

The Shaw Classifier (patented) furnishes the cleanest product, and the most accurate sizing, of any form of separator made. It is the only one that will entirely prevent dirty water from getting into the product.

Send for Book No. 640 "Link-Belt Plants for Washing Sand and Gravel."

LINK-BELT COMPANY

Leading Manufacturers of Elevating, Conveying and Power Transmission Machinery and Chains

CHICAGO, 300 W. Pershing Road — PHILADELPHIA, 2045 W. Hunting Park Ave. — SAN FRANCISCO, 19th and Harrison Sts.

INDIANAPOLIS, 200 S. Belmont Ave. — Offices in Principal Cities

3753

LINK-BELT

SAND AND GRAVEL WASHING PLANTS

When writing advertisers, please mention ROCK PRODUCTS

The Largest Paid Circulation Covering the Rock Products Industry

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Entered as second-class matter, July 2, 1907, at the Chicago, Ill., postoffice under the Act of March 3, 1879.

Contents for February 1, 1930

Departments

(The contents of this and previous issues of Rock Products is indexed in the "Industrial Arts Index," which can be found in any Public Library)

TRADEPRESS PUBLISHING CORPORATION
542 South Dearborn Street, Chicago, Illinois, U. S. A.
W. D. CALLENDER, *President*
N. C. ROCKWOOD, *Vice-President* C. O. NELSON, *Secretary*

LONDON OFFICE: Dorland House, Mezzanine Floor, 14 Regent St., S.W. 1.

NATHAN C. ROCKWOOD, *Editor and Manager*
EDMUND SHAW, Los Angeles, Calif., *Contributing Editor*
EARL C. HARSH, JOHN J. LANDY *and*
WALTER B. LENHART, *Associate Editors*
A. M. STERN, *Assistant Editor*
E. A. SINE, *Production Manager*

FRED S. PETERS, CARL L. WALKER, *Eastern Representatives*
280 Madison Ave., New York City. Tel. Caledonia 4474
GEORGE M. EARNSHAW, *Central Advertising Manager*
192 Hilton Ave., Youngstown, O. Tel. 24643
RALPH C. SULLIVAN, *Advertising Manager*
J. M. COX, NORMAN BOGGS, *Western Representatives*
Chicago. Tel. Wabash 3714-3715

SUBSCRIPTION—Two dollars a year to United States and Possessions. Three dollars a year to Canada and foreign countries. Twenty-five cents for single copies

TO SUBSCRIBERS—Date on wrapper indicates issue with which your subscription expires. In writing, to have address changed, give old as well as new address

The A. B. P. is a nonprofit organization whose members have pledged themselves to a working code of practice in which the interests of the men of American industry, trade and professions are placed first—a code demanding unbiased editorial pages, classified and verified paid subscribers, and honest advertising of dependable products. The A.B.C. is an organization which audits and verifies publishers' circulation claims and records.

Rock Products
With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Volume XXXIII | Chicago, February 1, 1930 | Number 3

Motor Trucks for Limestone Mine Haulings

New Castle Lime and Stone Company Has an Unusual Type of Operation

One of the mine openings, 46 ft. high and 35 ft. wide

Trucks dumping to the primary crusher

The other two openings. Note the upward dip of the stratified rock

THERE ARE each year more and more of the rock products industries changing from open quarry operation to room and pillar mining, so that mining of itself ceases to be a novelty, but the New Castle Lime and Stone Co., Dunbar, Penn., has gone a step farther and not only mines its stone for aggregate but uses motor trucks to transport the stone from the mine to the crushing plant. This is one of the few operations in the United States using jointly mining and truck transportation.

A second feature of this company's operation at Dunbar, Penn., is the utilization of the stone for production of paving blocks and crushing the resulting trimmings for the production of commercial aggregate.

The crushing plant was not built primarily to handle the wastage from paving block trimmings, nor was it an afterthought, but these two phases of the company's operation were worked out simultaneously. The result is reduction in operating costs and a conservation of raw materials.

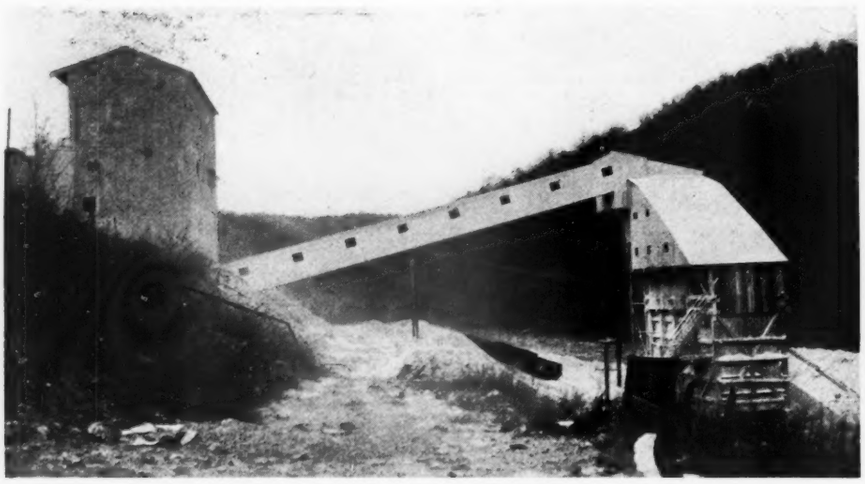
From Quarrying to Mining

The quarry was first opened in 1900 and prior to the spring of 1928 was operated by the Dunbar Lime and Blue Stone Products Co. At that time the present owners took over the property, and in December, 1928, started the construction of a new crushing plant. The old crushing plant has been dismantled. The plant was designed jointly by W. L. Wilson, consulting engineer for the owners, and K. L. Brown, general superintendent, for a capacity of 125 tons of stone per hour, and has come up to the designers' expectations. The new plant was placed in operation in December, 1928.

The town of Dunbar, Penn., is, roughly, 6 miles southwest of Connellsville, Penn., and at one time was a large coke producing section. Approximately 2 miles east of Dunbar a quarry has been in operation for many years producing stone from which the well-known "Ligonier blue stone" paving block was made.

Special Features of Plant

The outstanding feature of the crushing and screening plant that puts it in a class by itself are preliminary dry screening to remove the fines (minus ⅜-in. mesh) on Niagara vibrating screens, scouring the stone in a tumbling barrel as a preliminary to sizing, and the use of vibrating screens for scalping and sizing, exclusively. Washing of stone won from mining operations where there are no contaminating substances,



The crushing and screening plants

clay overburden, etc., naturally gives a clean aggregate, and is itself unusual, to say the least.

Mining Methods

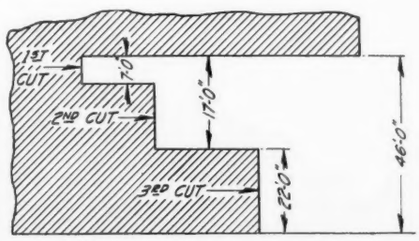
Ligonier blue stone is a hard and very abrasive siliceous limestone, blue to dark gray in color, and lies in a massive stratified ledge that dips upwards at an angle of approximately 10 deg., and is exposed along the rim of the valley for about 1500 ft. At the upper end the stone is still being recovered by open quarry methods, for use in making paving blocks. Below and closer to the crushing plant, three openings have been started into the deposit from the old quarry floor. These tunnel-like openings have a height of 46 ft. This height was necessary as the lower layers of stone did not give a good roof. The tunnels have a width of about 35 ft. and now extend into the hill only about 75 to 100 ft., as the mining feature is of recent origin.

Loading stone to motor trucks at the limestone mine

The tunnels are advanced by cutting a slice at the top of sufficient height for the miners to work conveniently, and of the width of the tunnel. This constitutes a removal of the top key and permits convenient barring down from the roof of any loose rock. When this preliminary cut has advanced 15 to 25 ft., the bottom of the cut is drilled and shot, making a second bench.

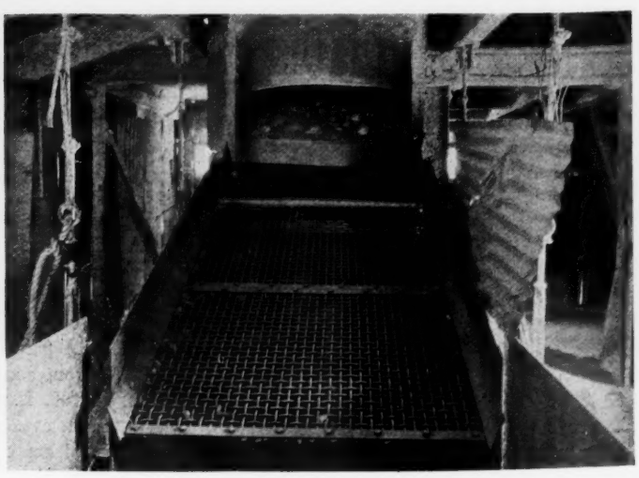
Once the general method of operation is started, drilling is all done with Ingersoll-Rand tripod mounted drills and with "Jackhamers" for drilling lifter or toe holes only. The holes are loaded with du Pont "Extra C" or Atlas "Akcodyn" No. 15 explosive, and yield 3 tons of stone per pound of explosive. The rock shatters well, partly due to the tightness of the ground and partly to the nature of the stone itself, so that few pieces are larger than the No. 9 Allis-Chalmers primary gyratory crusher can handle.

The rock that serves as a roof for the tunnel is a very good dimension stone material, and later the company may mine the roof stone for dimension stone purposes. Also, it is the intention of A. L. Patton, quarry superintendent, to later recover by underground mining the Ligonier blue stone for paving block production, but at present all stone from the mine is used for crushed aggregate only. Mining of paving blocks underground will permit the trimming crew to work regardless of the weather outside.



Cross-section of a tunnel showing how the face is advanced

At present the stone for paving block is taken from the open quarry in large blocks, which are drilled and split to the approximate size of the finished block and hand-trimmed to the correct size. Black powder is used for splitting the larger stone; and no dynamite is used in this part of the



Dust is removed from the stone by a vibrating screen before washing

The large blocks at the left will be split into paving blocks

quarry, as it shatters the stone excessively.

Blocks are made by the men on a contract price of 4c. each, the trimming of the stone being a trade in itself. An average production per man of 200 blocks daily is maintained with several trimmers having made as high as 600 blocks in 8 hours. The blocks are so made that 23 of them will cover one square yard of street surface. The quarry produced in the neighborhood of 900,000 blocks during the past year.

About 100 men are kept employed by the company, 26 being used for production of crushed stone and the balance in the paving block operation.

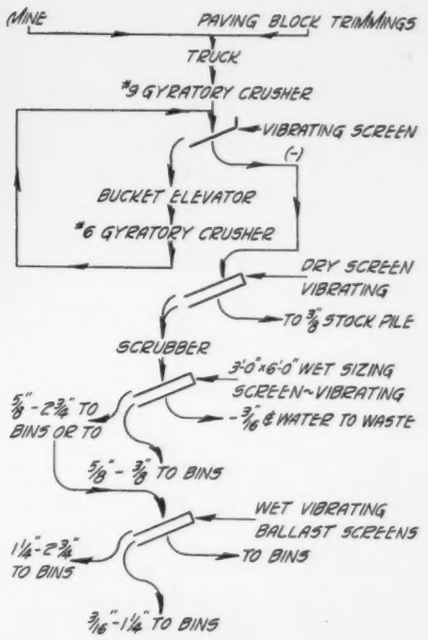
The trimmings from block-making are hauled to the plant by trucks and crushed. The blocks are hand-loaded to trucks and hauled to the railroad, about 2000 ft., and loaded for shipment. The crushing plant is served by the rails of the New Haven and Dunbar railroad, and connects with the Baltimore and Ohio and the Pennsylvania systems. The company rents trucks for hauling out the quarry products.

The broken stone in the large drifts is loaded by a ½-yd. Osgood air shovel mounted on crawler treads. This shovel has a 36-in. by 8-ft. vertical air receiver mounted on the deck of the loader. A second, gas-driven, ¾-yd. Osgood shovel is used in the open quarry.

Plant Operation

The trucks discharge direct to the primary crusher, which is set to 4 in., the material falling direct to a 4-ft. by 6-ft. single-deck Niagara vibrating screen having 2¼-in. square openings. The oversize falls to a 24-in. bucket elevator that returns the stone to a No. 6 Allis-Chalmers set to deliver a 2¾-in. product. A steel girder on which a 15-ton Peerless, hand-operated chain block on a trolley, spans both the No. 9 and No. 6 gyratory crushers. The discharge of the No. 6 gyratory also falls direct to the same vibrating scalper screen that serves the primary crusher. The minus 2¼-in. stone falls to a 30-in. inclined belt conveyor, and is delivered to a 4-ft. by 6-ft. double-deck Niagara screen having a 1-in. screen cloth on the upper deck, that acts to relieve the lower finer meshed screen from excessive wear. The lower deck has ⅜-in. square openings, and it is this screen that removes the fines prior to the scrubbing operation that follows. The dry minus ⅜-in. screenings are chuted to a small stock pile alongside the plant and recast to the main stock pile by a Marion No. 36 shovel. This shovel is also used for reclaiming from the main stock pile.

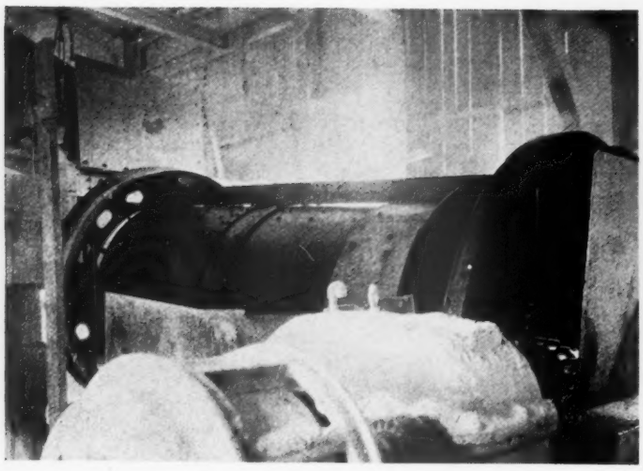
The primary crusher is belted to a 75-hp. Allis-Chalmers motor and the secondary crusher to a 40-hp. motor of the same make. Incidentally, all the motors in the plant are Allis-Chalmers except one. The inclined conveyor has a center-to-center length of approximately 145 ft., uses a Goodyear belt and Stephens-Adamson carrier and return rolls.



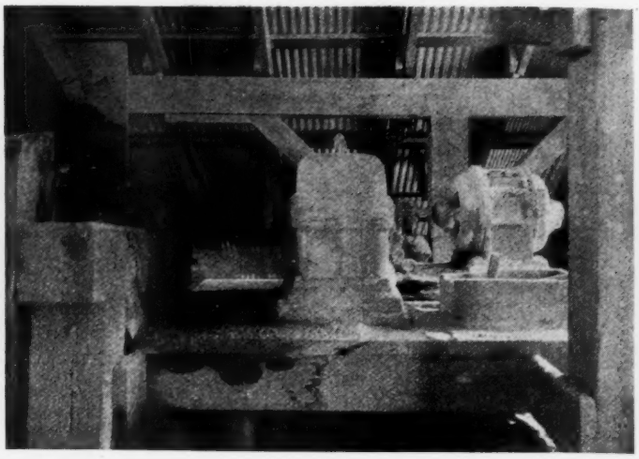
Flow sheet of operations, New Castle Lime and Stone Co., Dunbar, Penn.

The conveyor is driven by a 15-hp. motor through a Foote Bros. geared reduction unit, with a Morse Chain Co. flexible steel

Spoils and trimmings from the paving block operations are a part of the supply for the crushed stone plant



Stone is scrubbed in this barrel-type washer before sizing



The barrel washer is driven by a 15-hp. motor and speed reducer

coupling between the geared reduction unit and the head pulley. A similar drive is used on the 24-in. belt bucket elevator.

The scrubber was made from a 60-in. by 10-ft. rotary screen by replacing the screen with sheet steel and the addition of lifter baffles within the drum. A 15-hp. General Electric induction motor drives the scrubber through a Foote Bros. geared speed reducer, with two sets of Morse flexible steel couplings between the scrubber and the reduction unit.

The stone from the scrubber falls to two 3-ft. by 6-ft. double-deck Niagara vibrating screens. The upper deck has 5/8-in. square openings and the lower, 3/16-in. The oversize from the top deck (5/8-in. to 2¾-in.) is chuted to bins for concrete aggregate and road stone. Incidentally, this size is the largest seller. The oversize from the lower deck (3/8-in. to 5/8-in.) is chuted to the "chips" bin and the minus 3/16-in. and dirty water passed to waste. The 5/8-in. to 3/8-in and the 1¼-in. to 5/8-in. stone are used to a large extent for surface treatment of black top roads. The screenings are sold for cement block manufacture. All screening is wet with the exception of the scalping green and the one that removes the original fines. Each of the vibrating screens is driven by a 5-hp. motor through Texrope drives.

When it is desired to make railroad or highway ballast, the oversize from the 5/8-in. screen is passed to another Niagara double-deck screen having 1¼-in. square openings on the top deck, and the oversize from this screen (1¼-in. to 2¾-in.) is shipped for that purpose. The lower deck has 3/16-in. mesh screen. All the products from the screen are chuted direct to bins.

Water is taken from Dunbar Creek, alongside the plant, by a 6-in. De Laval centrifugal pump direct-connected to a 40-hp. motor. The scrubber is supplied by a 3-in. water line, the first two Niagaras by a 2½-in. pipe line, and the highway ballast screen by a 2-in. line, all three units using the output of the pump in those ratios.

Air for operation of the shovel, drills, splitters, etc., is supplied by a 1250-cu. ft. per min. Chicago Pneumatic air compressor driven by a 225-hp. synchronous motor. Water for cooling the compressor is supplied by a Demming triplex pump driven by a 5-hp. motor.

W. W. Duff is vice-president and general manager of the New Castle Lime and Stone Co.; William M. Andrews, secretary and treasurer. Elwood Gilbert is assistant secretary and treasurer. Mr. Andrews is also secretary and treasurer of the Lake Erie Limestone Co., Hillsville, Penn., and Mr. Duff is superintendent of the same operation.

MOTOR SCHEDULE, NEW CASTLE LIME AND STONE CO., DUNBAR, PENN.

Driving	Horsepower	Type of Drive	Motor Make	Remarks
Air compressor	225	Direct	Allis-Chalmers	Synchronous
No. 9 primary crusher	75	Belt	Allis-Chalmers	
No. 6 secondary crusher	40	Belt	Allis-Chalmers	
Scalper screen	5	Texrope	Allis-Chalmers	
24-in. bucket elevator	15	Foote gear reduction unit and Morse flexible coupling	Allis-Chalmers	
30-in. belt conveyor	15	Foote gear reduction unit and Morse flexible coupling	Allis-Chalmers	
Dry screen	5	Texrope	Allis-Chalmers	
Washer barrel	15	Texrope	General Electric	
Two sizing screens	20	Texrope	Allis-Chalmers	
Water pump No. 1	40	Direct	Allis-Chalmers	
Water pump No. 2	5		Allis-Chalmers	
Total horsepower	460			

Old Quarry to Be Developed Into a Park

A TENTATIVE plan for the development of Cement lake, on the upper Milwaukee river opposite Estabrook county park, has been prepared for the Milwaukee public land commission. The lake will be reduced in size but the island, the rock cliffs and caves and enough of the lake will be saved to make an attractive park and drive. The entire lake will be filled, leaving a depth of about 5 ft. of water.

Cement lake, which is the old quarry from which rock was taken to make Milwaukee cement, was bought by the city several years ago for a city dump. The department of public works proceeded to fill it until last summer C. B. Whitnall, secretary of the land commission, who had in mind the preservation of the lake as an attraction along the parkway proposed for the west bank of the Milwaukee river, organized a protest which resulted in dumping being stopped until a plan for developing the property into a park was prepared—*Milwaukee* (Wis.) *Journal.*

W. A. Van Duzer Elected President, Road Builders Association

W. A. VAN DUZER of Harrisburg, Penn., assistant chief engineer of the Pennsylvania department of highways, was elected president of the American Road Builders' Association for the ensuing year. Other new officers include: Vice presidents: J. R. Draney, Natural Rock Asphalt Corp., Louisville, Ky.; Henry G. Shirley, Richmond, Virginia, state highway commissioner; S F. Beatty, president of the Austin-Western Road Machinery Co., Chicago, Ill.; Samuel Hill, honorary life president, Washington State Good Roads Association, Seattle. James H. MacDonald, consulting road and paving expert, New Haven, Conn., was elected treasurer.

Identified with the American Road Builders' Association practically since it was formed, Mr. Van Duzer has served as a director of the organization for the last five years. In 1927 he was elected vice-president of the northeastern district and re-elected to the office in 1928 and again in 1929.

A part of the 216 trucks owned and operated by the Consolidated Rock Products Co., Los Angeles, Calif.

Modern Aggregate Producers Combination

Merger of Three Leading Companies in the Los Angeles District to Form the Consolidated Rock Products Co.

By James N. Hatch
Pasadena, Calif.

THE Consolidated Rock Products Co., recently formed by a consolidation of three of the largest producers of rock, sand and gravel in the Los Angeles district, is one of the largest producing companies of rock, sand and gravel in the world. This company now possesses facilities for producing and distributing more than 10,000,000 tons of these products per annum. Its operating plants serve 10 counties in Southern California, from Santa Barbara to San Diego and from the coast to the Sierras, and cover a territory of over 2000 square miles. With the producing plants are combined storing facilities so distributed over the territory that no important job requiring material will ordinarily be more than a few miles from a distributing point. The company has strategic locations that should enable it to keep pace with the demands of the territory it serves, even though this is a territory of exceptionally rapid growth.

Operates 23 Producing Plants

The Consolidated company now operates 41 plants, 23 of which are producing units with an aggregate capacity of more than 4500 tons per hour and 21 storage and distributing stations, 18 of which, in active operation, are equipped with modern gravity loading bunkers having a combined storage capacity of 48,000 tons. It also owns 10 sites for future storage yards and bunkers with a combined area of 100 acres. With these plant facilities, daily shipping upward of 200 cars by rail, together with from 100 to 300 trucks and trailers, it is possible to supply 30,000 tons of finished material per day. It is not surprising to learn that the sales of the Consolidated company are in excess of 8,000,000 tons per year, or more than 75% of the rock products business in the area served.

George A. Rogers, president, Consolidated Rock Products Co.

The Consolidated Rock Products Co. is in a position to benefit from the experience of 10 years of constructive organization. This company was formed by the consolidation of the Union Rock Co., Consumers Rock and Gravel Co., Inc., and Reliance Rock Co., each of these companies now amalgamated into the new company being the result of years of development during which a number of subsidiary companies had been acquired. For example, Union Rock Co. was incorporated in 1919 as Union Rock Co. of Delaware, and was formed by bringing under one organization three of the then largest rock products companies of Southern California. For the first year this company acted only as a selling organization to handle the distribution and apportion the sales among the three producers. But at the end of the year the three companies were

consolidated into one organization owning all the properties.

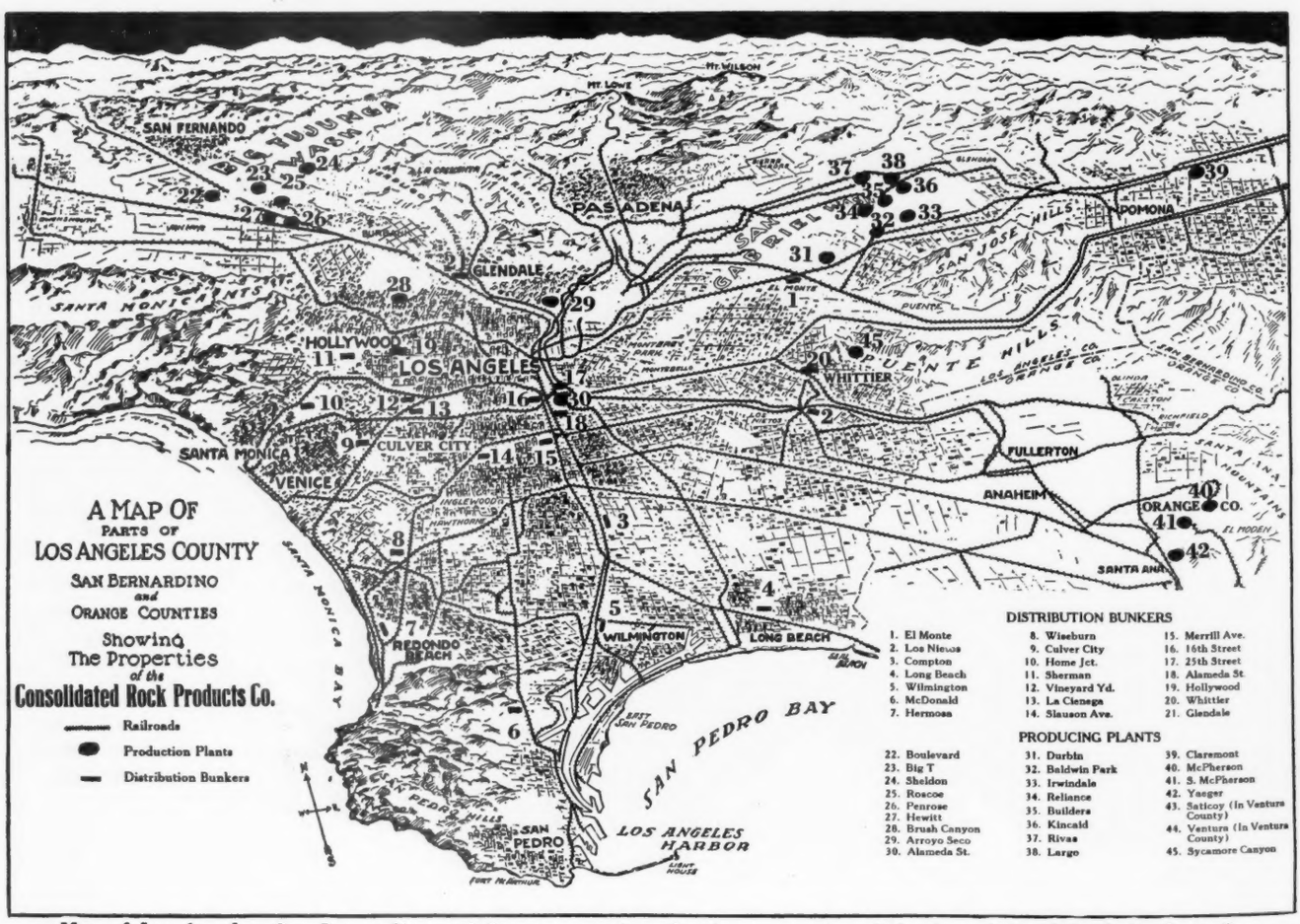
In the early part of 1922, George A. Rogers, prominent Los Angeles contractor, and now president of the Consolidated Rock Products Co., acquired the assets of the Union Rock Co. of Delaware and incorporated as Union Rock Co. The incorporators had a vision of the future possibilities and demands of this rapidly expanding territory and immediately set about reorganizing the properties and improving the facilities to meet the growing demands.

The growth of the Union Rock Co. was steady and most representative. In addition to the three original companies, the following other concerns were absorbed into the Union: Los Angeles Rock and Gravel Co., American Crushed Rock Co., Boulevard Rock and Gravel Co., Orange County Rock Co., Yaeger Rock Co., and the Kavenaugh and Twohy Rock Co. The Union company had reached a point of expansion in 1928 such that it had 50% of the business in the territory, with the Consumers and the Reliance companies as its chief competitors. The three organizations were then brought together as has been indicated.

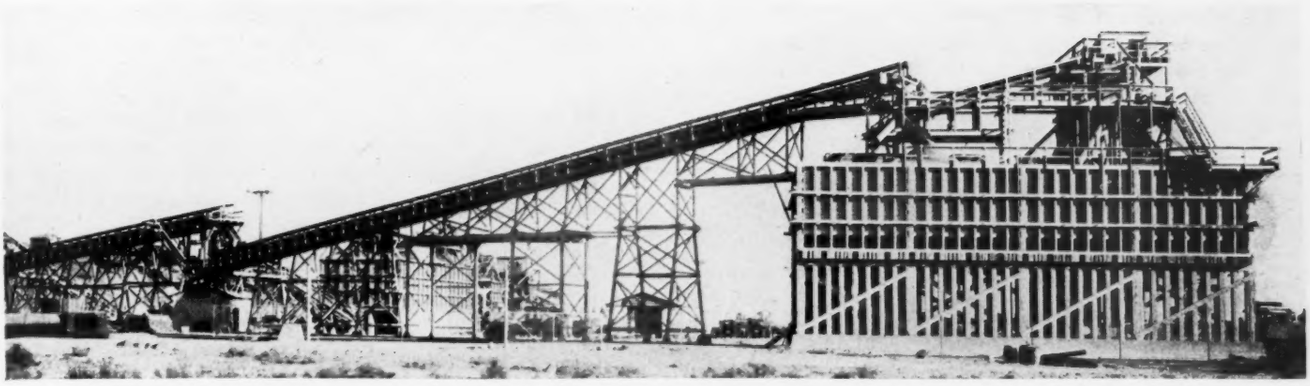
As a result of these consolidations the Consolidated company now operates over much of the desirable sources of raw material in Southern California. The lands found most valuable for the production of rock, sand and gravel are the beds of ancient rivers or "washes" as they are locally called, and are located in the San Gabriel wash to the east of Los Angeles, the Big Tejunga wash in San Fernando Valley to the north, and the Santiago Creek in Orange county to the south. These ancient rivers with their various tributaries, spread out like a great spider web with Los Angeles as the center. The total land holdings of the company comprise 2015 acres in fee and leaseholds on 2836 acres of these rock bearing tracts of wash. It is estimated that there is at least 1,000,000,000 tons of material available on this property, sufficient to meet the company's requirements on the basis of the present production for 100 years.

General offices of the company at Los Angeles

The material taken from these properties is a heterogeneous mixture of limestone, gneiss, broken granite and sand reaching to a great depth. Only a small portion of the rock products used in Southern California are quarried, almost all being taken from these glacial washes. These pits are worked to a depth of 50 ft. and more, and are of such size that locomotives and trains of dump cars are operated on the pit floors, taking the materials from power shovels to the adjoining production plants where the larger rock is crushed and screened into the various sizes of crushed rock, gravel and



Map of Los Angeles, San Bernardino and Orange counties, showing properties of the Consolidated Rock Products Co.



Claremont plant located in San Bernardino county

sand. All these products are thoroughly washed before delivery.

In the San Gabriel wash, the materials as found *in situa* are of almost the correct proportions of sand and rock required in concrete aggregates and consequently there is very little waste. In Santiago Creek, in Orange county, the materials are taken from the bed of the stream and in flood season these pits are refilled with materials brought down from the canyons, so that the supply is practically inexhaustible.

Of the company's 23 production plants, 8 are in the San Gabriel wash, 6 in the Big Tejunga wash, 2 in Ventura county, 3 in Orange county, 1 at Whittier and 1 near Claremont, just across the Los Angeles county line in San Bernardino county. The only quarry operated by the company is the Brush Canyon plant in Hollywood. In addition to the above, the company has the exclusive sales contract for materials from two other plants, one in the Arroyo Seco in the city of Los Angeles, and the other in Culver City.

Many of the plants in the Consolidated company, constructed under the direction of the predecessor companies' engineers, are models of efficient production. At the Boulevard plant on San Fernando wash, the material is brought from the pit on approximately 1200 ft. (single length) of wide belt conveyor. The Irwindale plant of recent construction, also uses the belt conveyor system. The Baldwin Park plant, one of the company's largest producers, built throughout of reinforced concrete and steel construction, utilizes the blast furnace type of skip hoist, bringing the material to the top of the structure, from which point the rock is effectively distributed and crushed into the various sizes. In the pit from which the Baldwin Park plant obtains this supply of materials, there are two 70-ton Bucyrus steam shovels of the railroad type, 20 standard gage dump cars and two 30-ton steam locomotives operating on nearly two miles of standard gage railroad.

The growth and development of the rock, sand and gravel industry can only be rightly

Shovel working in the Baldwin Park pit

The Los Nietos distribution bunkers near Whittier

comprehended when taken in connection with the increasing demand in the territory which it serves. As a modern story this really begins with the year 1914, for it was in that year that the first sand and gravel washing plant equipment was installed in Southern California at the Largo plant in the San Gabriel wash.

Prior to 1914, when the population of Southern California was about one-third of what it is today, the requirements both as to quality and quantity of materials can scarcely be compared with the demands of today. Concrete was but little used for roads and streets, and the rock, sand and gravel that was used in Los Angeles for concrete aggregates was largely brought in by teams in stick wagons and dump wagons, from the nearest available sand bank or river bed. The

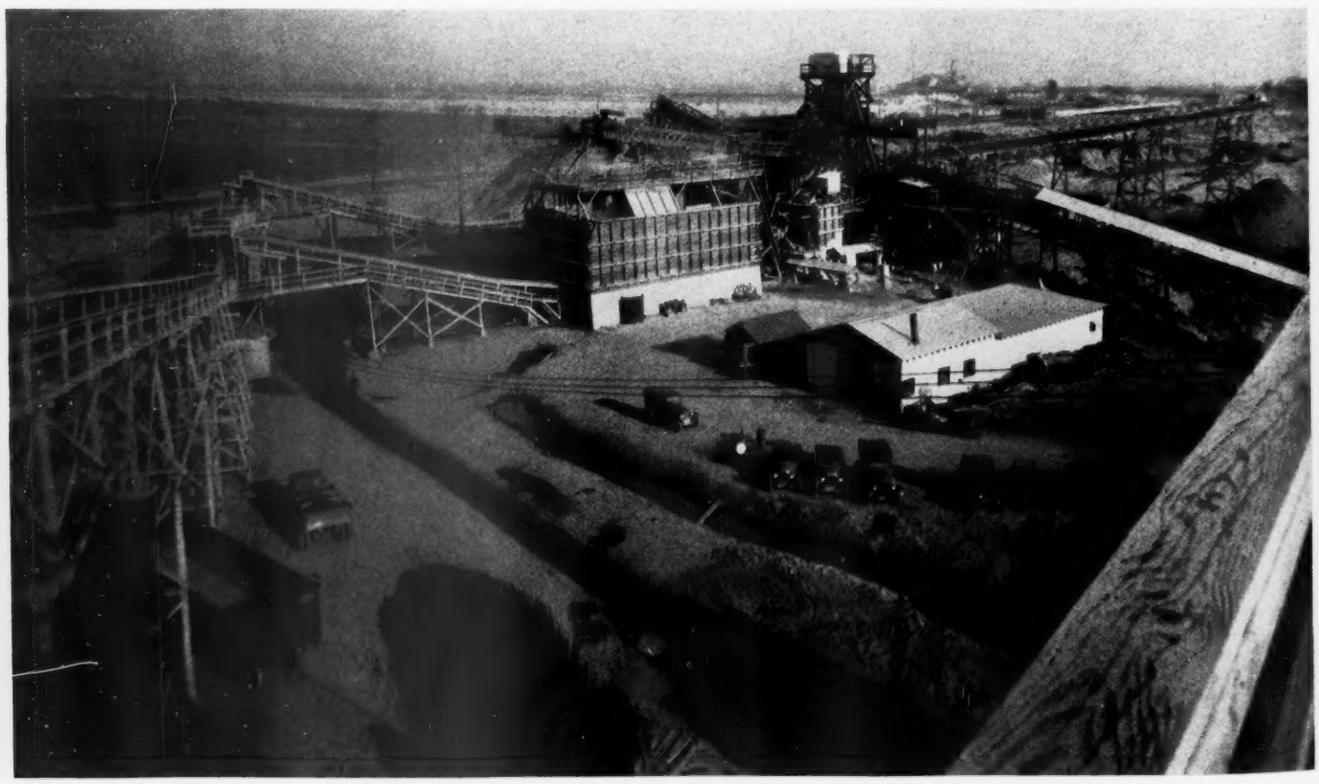
Los Angeles river was one of the most prolific sources of supply. Where no sand bank was near enough for wagon delivery, the materials were shipped by rail to the nearest team track and then handled several times before reaching their destination. These materials were screened by various methods, so that the coarser and finer sizes could be somewhat proportioned and the aggregates were mixed more or less in accordance with each contractor's idea of what constituted a good mix.

The Boulevard plant and storage bunkers

The Consolidated company is most particular to have all material of uniform quality and sizes and to have them thoroughly clean. So important has this matter of washing become, that at its Baldwin Park plant a concrete reservoir impounding 1,000,000 gal. of water has been built for the sole purpose of washing the materials going through that plant. As a matter of interest, the water supply at this one plant would be sufficient to furnish a city of 50,000 inhabitants with its entire domestic water requirements. The company has nine wells at its various plants and reservoirs with a total storage capacity of 2,500,000 gal.

Since 1922 the demand for concrete materials in the territory has been enormous. The growing use of the automobile has made the demand for permanent roads imperative. Automobile congestion is and has been one continuous problem during all this time. The number of automobiles registered in Los Angeles has increased more than threefold since 1919, and the demand for permanent roads and streets has increased in a corresponding ratio. Also the demand for concrete in large and small buildings of every kind, retaining walls, sewers and curbs has grown by leaps and bounds. The rock products producers have anticipated this rapidly growing market and facilities have been increased to meet the increasing demand.

On the accompanying map is shown the location of the plants of the Consolidated company. These, the principal producing plants, are located on direct railroad lines so that the output or any part may be loaded into cars and shipped to any of the 21 distribution bunkers, from which the materials will be delivered by trucks to the various jobs. To make the railroad facilities more complete the company found it to its advantage to build and operate two private railroad lines totaling four and a half miles of rail. One of these lines connects the Durbin plant with the El Monte bunker, where there is a connection with the Southern Pacific railroad; the other connects the Puente-Largo plant with the Kincaid plant. For



Boulevard plant, San Fernando wash, showing the conveyor system to storage bunkers and stockpiles

the operation of these railroads the company owns two 6-wheel, 85-ton locomotives and 12 double-hopper steel cars.

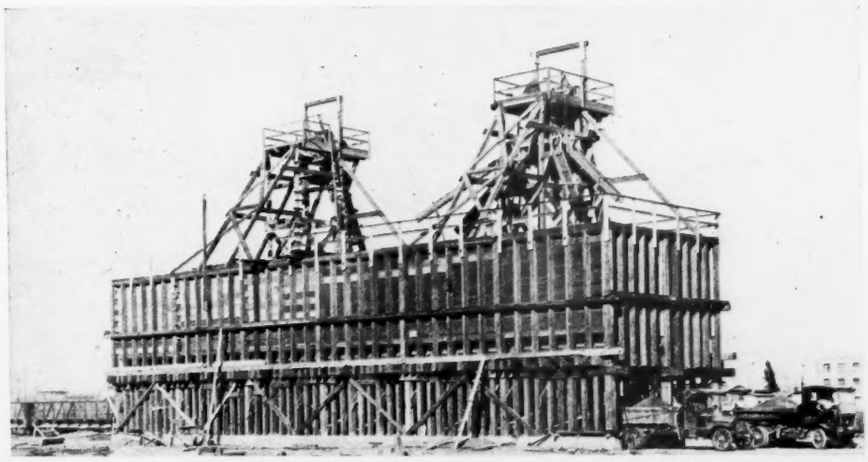
The investment of the company in railroad facilities and equipment alone is a very considerable amount. It owns outright and operates 38.45 miles of standard gage lines in and around Los Angeles. Of this, 18 miles is in plant storage and yard tracks, 5.3 miles in bunker yard tracks, 6.25 miles in pit trackage, and 7.9 miles on right of way. In addition it operates 18 miles of railroad company's spur tracks and 4.9 miles of its own narrow gage pit trackage. The equipment comprises 21 locomotives of from 6 to 12 tons; 20 steam locomotives of from 12 to 60 tons; 280 pit cars of from 5 to 35-cu. yd. capacity, and 16 40-ton plant or bunker cars.

The company's distribution bunkers, which have an aggregate storage capacity of 48,000 tons, are equipped with the most modern elevating and storage machinery so that a 50-ton car can be unloaded and the materials put into storage in the bunkers within 15 minutes. The different classes of materials are stored in different bins and are loaded into trucks by gravity feed. Of course, any particular job will be supplied from the most convenient bunker, and the bunkers are so located as to best serve the nearby sections as shown on the map. These bunkers together with the land occupied represent an investment of considerably over $2,000,000. In addition to bunker storage, the company always carries at its various plants a large supply of materials in various sizes in ground storage, for immediate delivery.

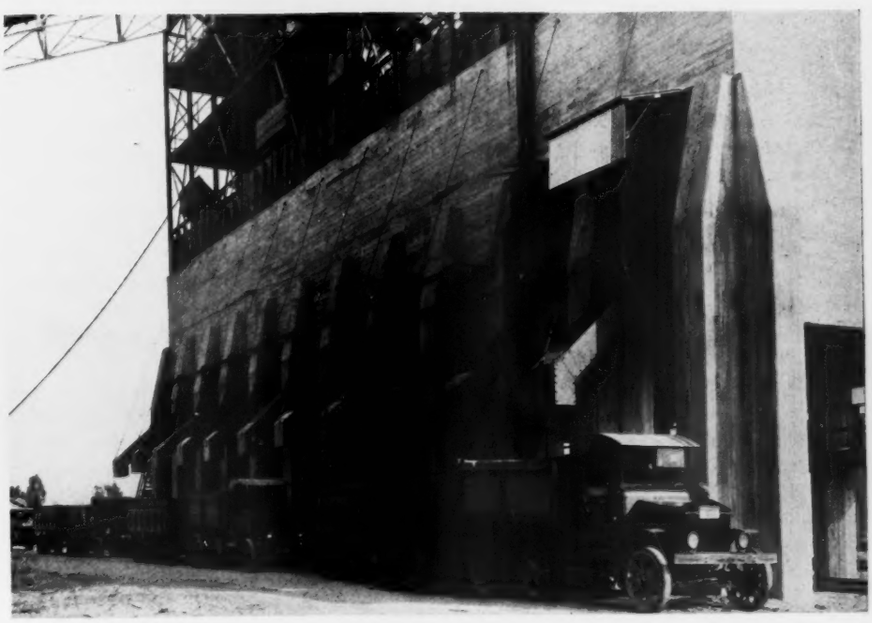
Practically all of the bunkers are equipped with batching facilities and a fleet of trucks is maintained with batch gates to deliver the ready-mixed batches to the jobs. The batches are dumped from the trucks directly to the skips of the concrete mixer, thus relieving the contractor of a large amount of hand labor.

To illustrate the magnitude of the demands made upon this company, a single day's pouring on an individual job will frequently involve 1000 or 1200 cu. yd. of placed concrete. For servicing this one job alone 66 trucks would be required. Demands of this size are frequent with the Consolidated company and in no way interrupts the service required on other large and small operations which may be running on the same day. Another demand that must be met is the specifications of the city and county of Los Angeles bridge department, which calls for 1½-in. gravel, which, by the way, is a special size and differs in grading from the standard specifications of other city, county and state work. In order therefore to supply this size, it it necessary to change the screens to conform to this specification. Were it not for the fact that this company

Orange county plant



Glausen avenue bunkers of 3000 tons capacity



Storage bunkers at the Irwindale plant, one of the newest and best built plants operated by the company

owns and operates a sufficient number of plants, the load of the extra demand in standard specifications of other large jobs at the same time could not be carried.

Handle Other Building Materials

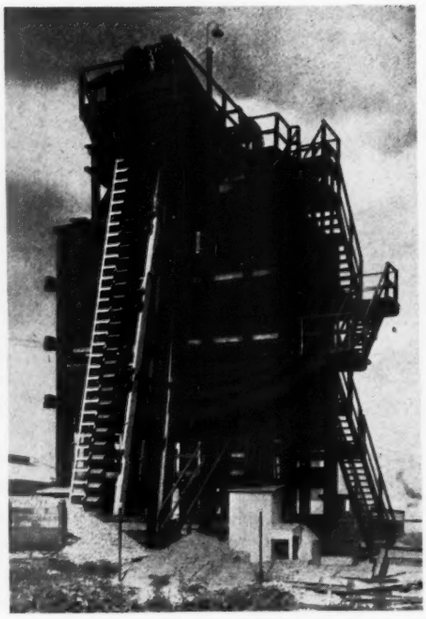
In addition to the material for concrete aggregates and for hard road and street surfacing which the company produces, it is now adding the handling and sales of a full line of building materials, such as lime, cement, plaster, plaster board, etc. Four depots for such material are now operating and new stations will be added each month until all bunkers will be provided with a full supply of building material, which will be available for short haul delivery.

Practically one-half of the output of the company is sent directly from the producing plants to destination by rail. The balance finds its way to the market through the bunker system and is delivered by a fleet of trucks owned by the company. There is, however, a considerable portion of the bunker material that is delivered directly from the bunkers into the customer's own trucks and thus taken to the job. The company owns a fleet of 216 motor trucks, most of which are six-wheelers, and the remainder four-wheelers. These trucks are painted a uniform orange color as an expression of up-to-date service. Additional trucks are leased when required.

Sales Practice

By the use of labor-saving machinery and unique methods of distribution, production costs have been reduced until it is now conceded that the cost of rock, sand and gravel in the Los Angeles district is as low as or lower than in any other metropolitan center in the country. Materials delivered directly by railroad cars from the producing plants are sold at what is known as "base plant price." Materials sold at the bunkers to the customer who uses his own truck for delivery are sold at "base plant price" plus freight and handling charges. The distribution territory is marked off into zones for purposes of quotation. In "zone sales" where the company delivers to the job, a charge is made to cover all the items of delivery which is made contingent upon the length of haul.

The output of the Consolidated Rock Products Co. is at present at a rate of more than 8,000,000 tons per year. In this connection it is interesting to note that the predecessor companies of the Consolidated have been pioneers in the Southern California territory in changing the basis of measuring rock, sand and gravel from the old inaccurate method of sales by the cubic yard to the modern method of sales by the ton. At each bunker a certified weighmaster weighs each truck-load as the truck is driven over the platform scales and gives the driver a ticket showing the exact weight of the load. The company's slogan is "Buy rock by the ton and get what you pay for."



Batching plant at Hollywood

John Wunder Company Sold to Building Materials Firm

THE John Wunder Co., Minneapolis, Minn., one of the largest producers of aggregates in the northwest, has been purchased by the Landers-Morrison-Christianson Co., a large building supply firm in the northwest, and for the last few years a large producer of aggregates.

Announcement of the purchase was made by John Wunder and by E. H. Norblom, president of Landers company.

Property involved in the transaction includes the stone quarry at 1500 Johnson Street, Northeast, and a gravel and sand pit covering approximately 300 acres of ground at Broadway and K street. The transaction also includes the gravel plants and all of the handling equipment.

The Landers-Morrison-Christianson Co. is the result of the consolidation of three companies and was organized in 1904. In 1921 the company developed a gravel plant at St. Louis Park.

The Wunder properties will be continued as at present under the management of the Landers-Morrison-Christianson organization.

Other officers of the Landers-Morrison-Christianson Co. are A. M. Christianson, vice-president; S. E. Berg, secretary, and J. H. Morton, treasurer.

The Traprock Co. of Minneapolis, another organization owned by Mr. Wunder, which was not involved in the transaction, will be continued by Harvey J. Wunder, son of John Wunder. Other Wunder subsidiaries will be discontinued.

John Wunder, the founder of the company, was one of the most prominent aggregate producers of the northwest. Born in Cincinnati, he came to Minneapolis by boat 49 years ago and entered the contracting business. He built the first reinforced concrete building in the northwest for the Northwestern Knitting Co., now the Munsingwear Corp. It still is a part of the present Munsingwear plant.

About seven years ago he discontinued his contracting business and devoted all of his attention to production of aggregates, a business he launched some time before. At the time of the sale his operations produced annually about 600,000 tons of sand and gravel from two plants.

Mr. Wunder has announced his plans of retiring from active business. He will continue to make his home in Minneapolis as heretofore.—*Minneapolis* (Minn.) *Journal.*

Vermiculite Deposits Found in North Carolina

COMMERCIAL possibilities in the development of vermiculites of North Carolina, with reports of extensive deposits from several counties, are seen by State Geologist H. J. Bryson. In reporting to Mr. Bryson, N. N. Rogers of Shooting Creek, Clay county, states that he has found large deposits of the jefferisite variety of vermiculite in that county. "I have cut the vein at nine places, nearly a mile in length, and at several places 45 ft. across. I have cut it at numerous places 30 ft. across in a lead about 1¼ miles long," he writes.

Other specimens of vermiculite have been received. The Clay county vein or like material is described as being virtually pure or at least pure enough to obviate the necessity of milling or concentrating.

So far as information is available, the deposits of vermiculite in North Carolina are the only ones in eastern United States which offer commercial possibilities. Other sources of this vermiculite in Montana are being developed by the Zonolite Co., Libby, who are marketing the mineral under the name of "Zonolite," as a lightweight insulator, magnesia cement and wallboard aggregate filler, pigment for wall paper and a number of other uses.—*Asheville* (N. C.) *Citizen.*

Carbon Limestone Had Good Year in 1929

STOCKHOLDERS of the Carbon Limestone Co., Youngstown, Ohio, and subsidiaries were informed at the annual meeting that the volume of tonnage in 1929 was the largest for any 12-month period in recent years. The company produces fluxing stone for blast furnaces in the Youngstown and Pittsburgh districts, road building stone, agricultural limestone and rock dust for coal mines. The company expects a large volume of business in 1930, because of the increased appropriations for road building in Ohio and Pennsylvania.—*Cleveland* (Ohio) *Plain Dealer.*

The plant of the Charleston Mining and Manufacturing Co. at Mt. Pleasant, Tenn., viewed from across the settling pond

The Phosphate Industry of Tennessee

Part I—The First of Two Articles Describing the Deposits and Plants of the Mt. Pleasant District

By Walter B. Lenhart
Associate Editor, Rock Products

THE PHOSPHATE DEPOSITS of Maury, Hickman, Giles and Lewis counties have been for some 36 years a source of phosphate for acid phosphate, direct application, and various chemical and metallurgical uses.

There are now ten comparatively large operations. Problems of production, competition, distribution, etc., are similar to other rock products industries, yet prices are not what the operators feel they should be so as to permit a fair profit; business is brisk, and there is no price-cutting or so-called wars at the present time. Resources are too limited to be thrown away.

The plants of the Charleston Mining and Manufacturing Co., Hoover-Mason Co., International Agricultural Corp., Armour Fertilizer Works, American Agricultural Chemical Co., Ruhm Phosphate and Chemical Co., Thomson Phosphate Co., and the Federal Chemical Co. were all operating to full capacity, reporting business to be excellent for the year 1929, with prices higher than they had been at any time since the war. Owing to the increased uses of phosphorus as a direct fertilizer, in steel production, chicken grits, etc., the operators anticipate a continuance of these favorable years.

The Ruhm Phosphate and Chemical Co., with offices at Mt. Pleasant and Chicago, Ill., is remarkably successful in its campaign to educate the farmers in the use of finely ground raw phosphate rock for direct application to the soil.

One of the metallurgical uses of phosphates from this field is in connection with the manufacture of ferrophosphorus, an alloy used in the production of steel sheets and tubes. The process was developed by J. J. Gray, Jr., at Rockdale, Tenn. Mr. Gray recently sold the plant and his patent rights to the Tennessee Products Co., which now operates one furnace at Rockdale.

New Developments in the Field

There are several new developments in the phosphate industry that are of interest to readers of ROCK PRODUCTS who are interested in fertilizer materials. The phosphate industry of southern Tennessee is closely linked with the fertilizer business, and the names of producers of phosphate and manufacturers of fertilizer are in most cases synonymous. Perhaps the more familiar use of phosphates as a fertilizer was the use of the acidulated product. Lately finely ground raw phosphate rock has been developed, and a large tonnage of this material is now shipped both in bulk and in 100-lb. sacks. This material is applied to the soil direct.

A summary of the use of finely ground phosphate rock, directly applied, has shown that there is a wide diversity of opinion as to the benefits resulting.

However, most agricultural experiment stations reporting adverse results have used coarsely ground phosphate rock (60 to 80% through 100 mesh) such as was formerly used in most fertilizer plants to make acid phosphate. Illinois, Kentucky, Iowa and a few other state experiment stations have used finely ground phosphate rock (90 to 100% through 100-mesh) and have secured favorable results, comparable to superphosphate. The new material, guaranteed 80% through 300-mesh, has lately been widely experimented with—with most favorable results.

In its application it is recommended that, if the soil is slightly acid, the phosphate be applied first, giving the acid time to react with the calcium phosphate before applying limestone for neutralizing the residual acid, and in general the two fertilizers should not be applied together.

Another interesting probability is along the theoretical lines that only the phosphorus which is of organic origin is available for plant assimilation. Where the deposit is of marine origin and the limestone removed by subsequent solution of the carbonate, the product, on this theory, is more easily broken down for the use of the plant. However, if the phosphatic material has also been dissolved by these weakly acid waters and then allowed to stand over a marl, for instance, researches have shown that the phosphate will be precipitated, probably as apatite; in

From mine to finished product, at the Wales, Tenn., plant of the International Agricultural Corp., showing the washer, drying plant, phosphoric acid plant, and also the section for manufacturing phosphate products

any event, as inorganic phosphates; and if the deposit is formed mostly from this secondary enrichment, the resulting phosphate is, according to this hypothesis, not a good material for direct application. Practically all the Tennessee phosphate rock deposits are of organic origin.

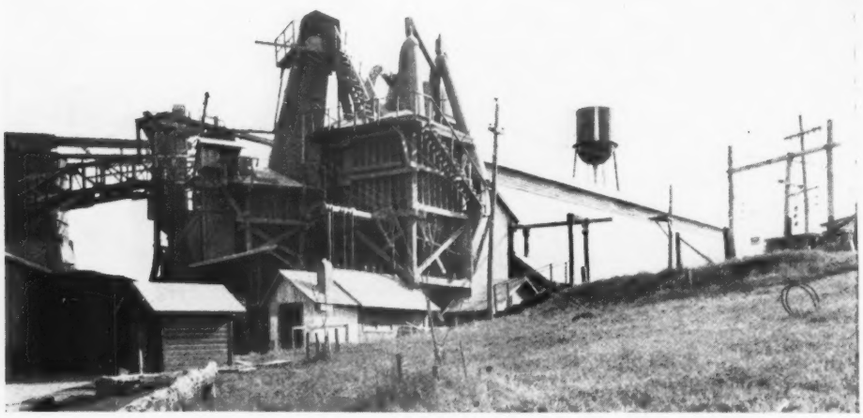
Plant of the Tennessee Products Corp. at Rockdale which produces ferrophosphorus from Tennessee phosphate

Where the material is acidulated with sulphuric acid, the phosphatic material is converted to soluble form, and although when applied to the soil it quickly reverts to the insoluble form, it has the fineness of a chemical precipitate, so it is easily assimilated by plant life, and for this reason the crop, the first year, is markedly benefited by the application. While in some cases the mere finely ground rock may not show a marked crop improvement for several seasons, this is practically always because of coarse grinding, and the finely ground material now being produced under the trade name "Lime Phosphate," ground so that 80% will wash through a 300-mesh sceen (0.0018-in. opening), gives practically always first crop returns equal to superphosphate (acid).

When phosphate is treated with sulphuric acid, as in the manufacture of ordinary, soluble phosphates, gypsum is formed as a part of the reaction, and this mineral is notorious as a source of sulphur, which is also needed for plant life and might in a measure account for some of the benefits from the acidulated product.

A typical pit of the district, showing the uneven limestone surface exposed when the phosphate ores are removed

The phosphates of central Tennessee may owe some of the success with which they are meeting as direct-application fertilizers, working on the theory outlined, as being of



The pulverizing plant of the Hoover-Mason company. The sacking equipment is in the building at the left

A dragline excavator stripping at one of the pits of the Charleston Mining and Manufacturing Co. The view gives a good idea of the character of the country being operated

The lighter-colored top material is wasted and the darker phosphate sands beneath are removed by dragline excavators in this pit of the Charleston company

Piles of overburden at the Charleston company's pit removed from the phosphate deposits in the areas to the right

organic origin. They are residual phosphates left after a phosphatic limestone has been subjected to alternate weathering periods. They were laid down in Ordivician times.

Phosphates are especially beneficial to grain crops such as corn, wheat, barley, etc., and result in a very pronounced increase in the yield of these grains, and in all cases seem to benefit the reproductive portions of any grain. Instances are cited where wheat yields gave enormous tonnages per acre of straw, but, until treated with phosphorus, the heading portion was very deficient; as low as 21 bushels per acre before application, and after application of the non-acidulated, finely ground Tennessee phosphate, the yield was increased to as high as 63 bushels of wheat per acre, and this high yield was continued for several years. Phosphate producers show that with the application of from one to four tons per acre, depending on the amount of phosphates already in the soil, there will be double the amount of phosphorus present in the soil that there was at the start. It is significant that the figure of 63 bushels per acre quoted was the highest wheat per acre in the United States for that year. With the new finely ground lime phosphate, even in small annual applications of a few hundred pounds per acre, good results are secured. Phosphates, besides acting to increase the yield, cause the plant to mature earlier.

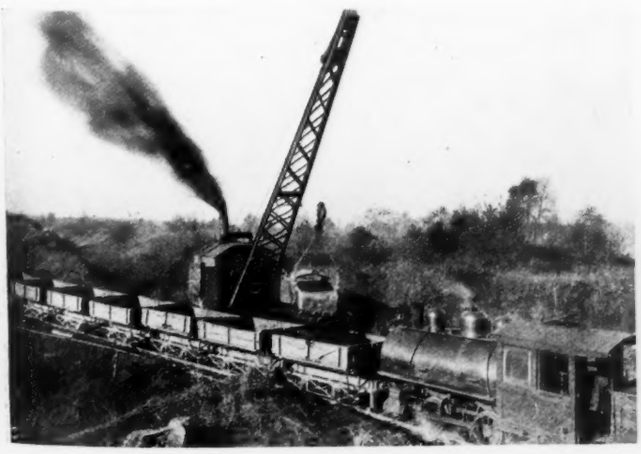
When one considers that the average per acre yield of wheat for the world is between 9 and 10 bushels per acre, it shows the important part that fertilizers of this nature play in the ultimate cost to the consumers.

It requires 1.59 lb. of lime phosphate (33% phosphoric acid) to produce 1 bushel of wheat. At 1¼c. per lb. this is 2c. The excess phosphate added to the soil maintains its productivity for many years. In other words, the cost of the phosphorus for increasing the yield from 21 bushels per acre to 50 bushels would total 58c.

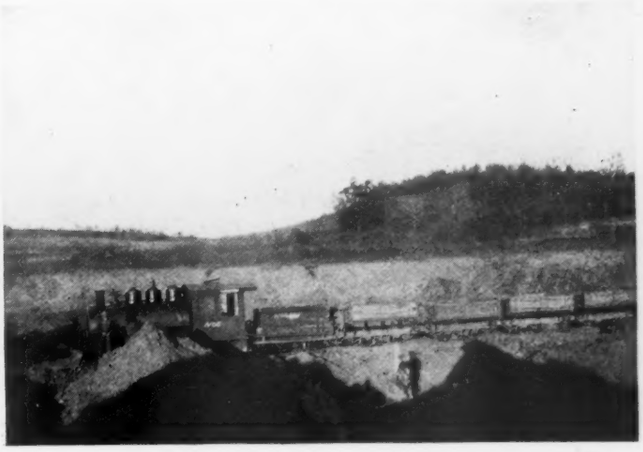
Nature of the Tennessee Deposits

The deposits of phosphate rock that are of commercial importance in Maury and Hickman counties occur as sedimentary residual, banded deposits lying on top of the phosphatic limestones, and the valuable portion is referred to as brown rock. The name brown rock is a misnomer, as the material is not a rock but could be more properly described as a brown earth deposit, interspersed with granules and lumps of varying sizes, all mixed with loam and clay, constituting the impurities left from the disintegration of the original limestone. All the deposits that are being exploited near Mt. Pleasant, which is at present the main producing center of that field, are overlaid with from a few feet to 20 ft. of reddish clay loam that is removed with dragline excavators, usually 1½- to 2-yd. bucket capacity, after which the same equipment removes the soft, earthy phosphatic material. After the dragline excavator has removed as much of this material as it possibly can, and in some cases this tonnage is not great, considering the amount of overburden handled, the remaining soil is hand shoveled out of the crevices or cutters, as they are locally referred to, to some convenient point where the power shovel can reclaim it.

The early operations consisted of removal of the overburden, with teams of mules, after which the brown rock was shoveled into cars by means of a ten-tined manure type fork. The material that stayed on the fork was considered "ore" and the fines rejected as waste. Later it became apparent that by suitable washing methods the entire phosphatic

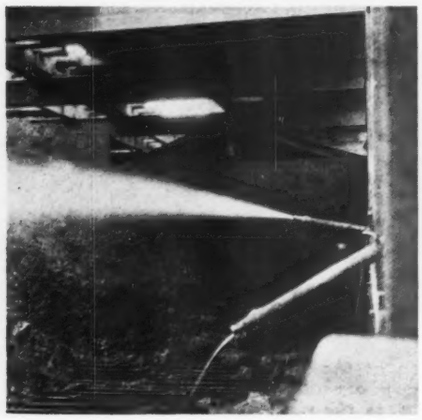


A dragline excavator starting to open a new pit on the property of the Charleston company



A steam locomotive, such as is typical of all operations in the Mt. Pleasant district, at pit of the Charleston company

stratum could be mined and a fairly uniform and high calcium phosphate material secured. At present the bulk of the material as it is

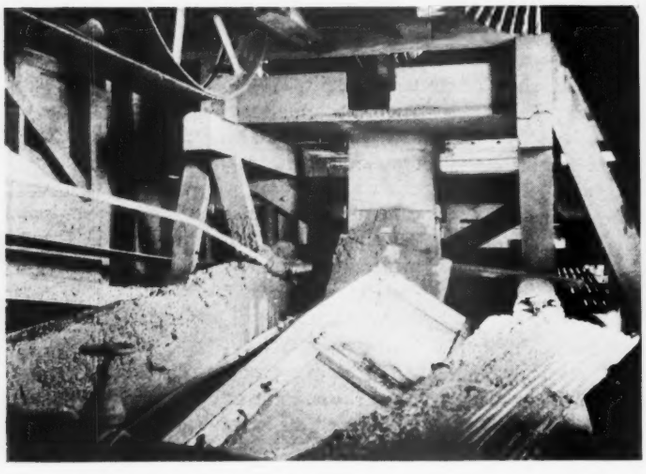


Sluicing phosphate sand through grizzly with hydraulic monitors at the Charleston plant

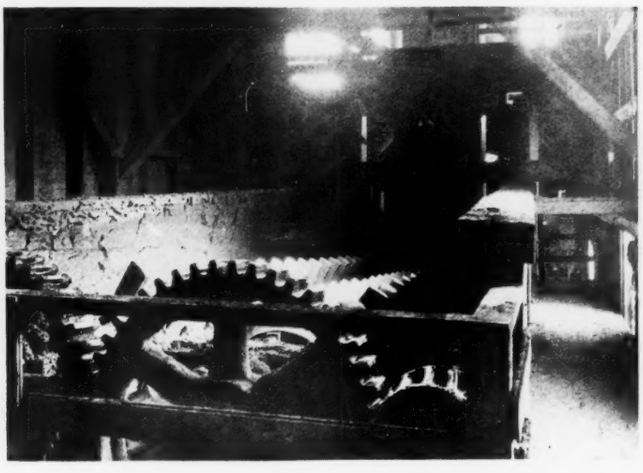
mined will have a bone phosphate of lime content (B.P.L.) of from 50% to 60%, and anything that is under the percentage given is considered waste and discarded by repiling where higher grade material was removed.

Drying lump phosphate at the Charleston company's operation

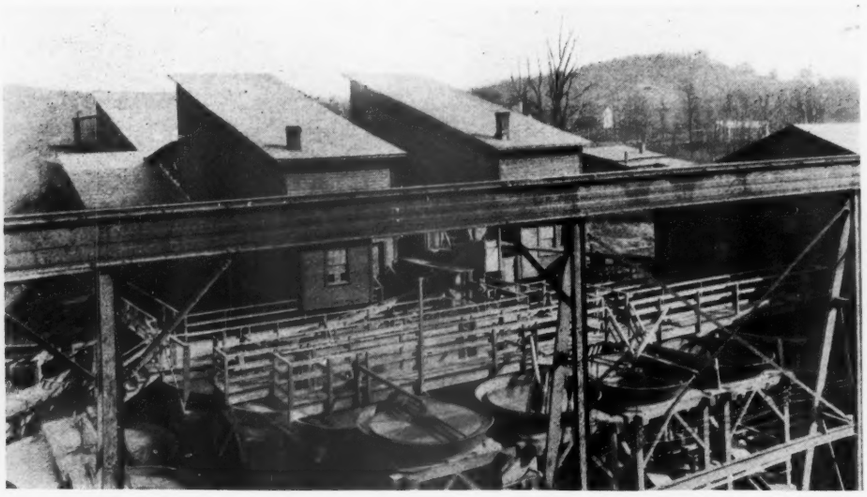
The washing process used is simply the removal of the adhering clay and earthy material by first crushing to, roughly, a minus 2-in. material, after which the product is washed by a log washer, tumbling screens, Dorr classifiers, Allen cones, etc., until the final sands are free from clay and will have a B.P.L. content of not less than 72%. In carrying out this process the striking thing to one accustomed to "tailings" of metal mines, that are rated in cents per ton, or at best a fraction of a percent, is that these finely divided tailings have an average B.P.L. content of close to 35%, and in some cases, depending on the class of rock being washed, have a content of 60% B.P.L.



Revolving hexagonal screen for separating lump rock from the sands at the Charleston operation



Log washers such as these in the Charleston plant are used in practically all the washing plants in the district

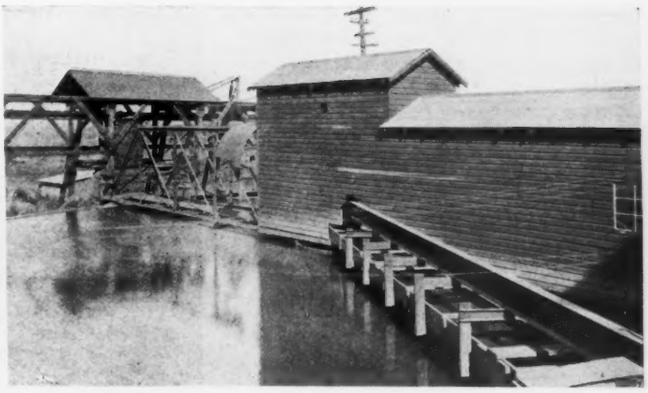


The 16 washing cones at the Charleston plant prepare the sands for a final cleaning on concentrating tables

All the operators realize that eventually a method will be developed for treating this product, and in many cases are conducting researches of their own to solve the problem, and until that problem has been solved they are all retaining the tailings by storage in outdoor settling ponds.

Some work has been done by the U. S. Bureau of Mines on the application of oil flotation to a somewhat similar problem. It has been reported that the International Agricultural Corp. has successfully solved the problem of removing the phosphate in the fines of this company's Florida operation, and is now building a plant for use of oil flotation methods. Undoubtedly if this method works out successfully in Florida it can be made to work on the Tennessee fines. By their research work, then, the engineers of the International Agricultural Corp. will

The outside storage yard at the Charleston plant, served by an overhead crane which delivers sands to the concentrating tables or concentrates from the tables to drier building



The thickener at the operation of the Charleston company is used to clean the phosphate slimes which overflow from the washing cones

have made a notable contribution to our national economy.

After spending ten days in this field and talking with practically all the important producers of that section, there is no doubt that the tonnages of high-grade phosphatic material remaining in the Mt. Pleasant field are limited; the peak in this respect has been passed, but the tonnage of low-grade material that has never been touched is extremely large, and later that portion of the field that was worked by hand, using the pitchfork method of separation, will be reclaimed when a cheap, positive and simple method of concentration will have been developed.

When asked as to the greatest problem that confronted the phosphate producers of that region, the answers of practically all could be summed up by saying, "Finding the phosphatic sands and concentrating them after they have been found."

Charleston Mining and Manufacturing Co.'s Operation

This company's plant was described in the February 25, 1922, issue of Rock Products, and since that time many changes have been made, all of which have tended to increase the B.P.L. content of the finished materials, increase recovery of phosphate values and to effect economies in operation. This company's operation is probably the largest in the Mt. Pleasant field and its capacity is given at 400 tons of finished product per day.

The Arrow mines of the Charleston company are located a few miles southeast of Mt. Pleasant and consist of several pits scattered over a wide area. The general formation and appearance of these pits are practically the same and are typical of the field.

For stripping and loading, the company has a total of seven steam dragline excavators, four being Bucyrus machines, two Marions and one Browning, all having 1½-yd. to 2-yd. buckets.

The rock is loaded into 4-yd. Western side-dump cars and hauled to the washer in trains of 12 cars each by means of 18-ton, coal-fired Davenport and Porter steam locomotives. Transportation is over 36-in. gage industrial tracks, and the company has roughly 20 miles of trackage to the various pits, most of which is well graded, permitting of much faster haulage than is found in most rock products industries.

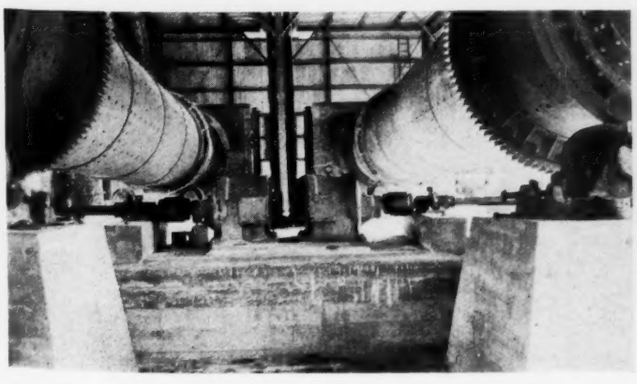
In the article published in 1922 there was described the 390-ft. trestle connecting the field with the plant and the rotary car dumper. The trestle has been for the most part eliminated, or rather buried, by filling in waste material from the pits. The rotary dumper has been eliminated and the cars are now dumped by hand.

The washing part of the Charleston plant is divided into two units, for this first step in the process. Both of these units are identical.

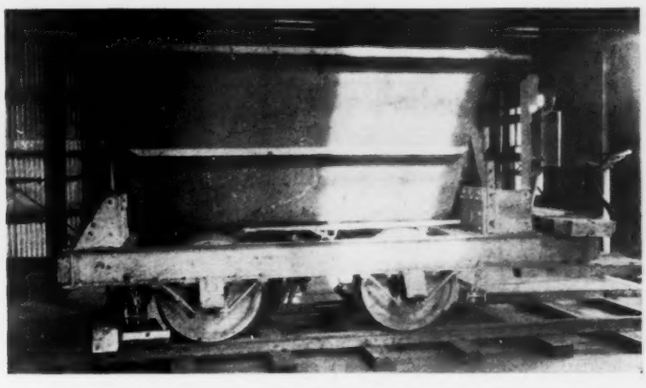
The cars are dumped at a considerable elevation above the floor of the plant to a rectangular bin provided with a bottom or floor made of old rails spaced at 6-in. centers. Here the earthy material is sluiced by four hydraulic monitors. The water washes and partially disintegrates the lumps which fall to an inclined steel floor below that delivers the fines to a drag classifier. The unbroken lumps, that stay on the grizzley, if limestone, are discarded, but if phosphatic material, are discharged to the ground outside the building, where they are picked up by hand, loaded in wagons and hauled to the drying field.

In preparing this area for lump drying, 4-ft. oak cordwood is piled to a depth of 12 to 18 in. over the entire floor, after which the damp lump phosphate is piled on top. The material is allowed to air dry for a considerable time, after which the wood is ignited and the drying operation completed.

Going back to the plant operation, the fines through the 5-in. grizzley pass to the drag washer that delivers the material to a set of 36x16-in. rolls with manganese steel wearing rings. These "Tisco" rims seem to be the most popular alloy for this work, it would appear. This material falls to a bucket elevator the boot of which rests in a pit



Two of the rotary driers in the new plant of the Charleston Mining and Manufacturing Co.



Car used for delivering the dried material to storage sheds. This type of car is typical throughout the district

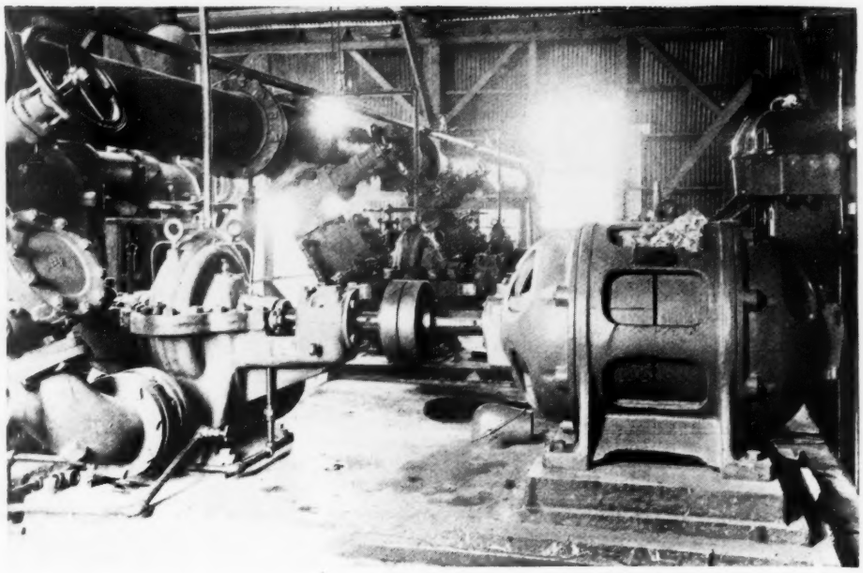
that is partially filled with water, and further assists in the disintegration and washing of the phosphate bearing earthy materials. The bucket elevator discharges to a 24-ft. log washer which sets on an incline of about 5 deg. with the high end at the discharge. The log washer delivers the material by gravity to a hexagonal rotary screen washer with round perforations. The oversize from this tumbling barrel passes by gravity to a second log washer, and any remaining adhering clay is removed. This log washer is set similar to the first and discharges to a bucket elevator that serves a second screen.

Grinding building in which is housed the five-roller mill for fine grinding at the Charleston plant

The washers are each driven by 125-hp. Allis-Chalmers motors through a series of counter and jack shafts. One thing that is rather unusual in connection with the driving equipment is the use of Nuttall flexible couplings between the drive motor and its extend shaft, which serves as the line shaft, which in this case is necessary as the motor foundation and line shaft bearing supports are on different foundations.

The flow of the finer materials is not so simple and the methods here used are perhaps a little more complicated than at the other plants visited. The wash waters from the 5-in. grizzley, and overflow from the drag classifier, at the very beginning of the operation overflow and pass to the feed end of the second log washer. The overflow at the discharge end of this washer and the fines from the rotary washer join each other by gravity at a centrifugal pump that delivers the products to the Allen cones.

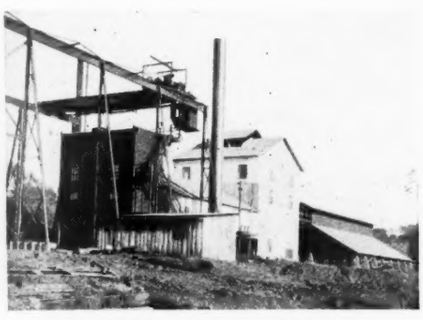
There is a total of 16 Allen cones, 12 of which are jet cones and 4 smaller hand-discharging cones. The cones all operate in series in four banks of three cones each, and the cones in each series are set one slightly above the other so that the overflow from the higher small finishing cone discharges by gravity to the next cone in the four-series setup, and so on, the final overflow passing to the Dorr thickener. The sands enter the top of the lower cone and this material on settling is automatically jetted to the top of the next high cone, and this is repeated a total of three times, as the fourth small cone merely acts as a settling device.



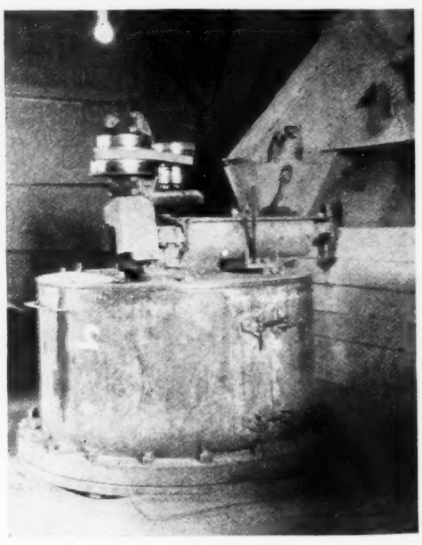
New direct-connected, centrifugal pump to replace the steam pumps at the Charleston plant

The Dorr thickener tank has a 50-ft. diameter, is 7 ft. deep at the center, 4 ft. at the outer edge, and is built of reinforced concrete. The bottom of the tank rests directly on the ground. The rabble mechanism is driven by a 10-hp. Allis-Chalmers motor, 1145 r.p.m., direct-connected to a James gear reduction unit, which in turn is belted to gears at the vertical shaft, further reducing the speed of the plows to one revolution per 3 minutes. The rabble mechanism is protected by the usual Dorr device, so that in the event of overload on the plows the load is thrown off the vertical shaft, in which event the plows and vertical shaft must be raised before proceeding.

The sands from the Dorr thickener are received by a battery of four diaphragm pumps and delivered to two smaller jet discharging cones operating in series, the second one of which jets to a small hand-discharge, dewatering cone. These three cones are set alongside the first mentioned Allen cones, and the overflow cascades in a similar manner as well. The final overflow, however, returns to the Dorr thickener feed. The settled sands are discharged to ground storage also, where they are picked up by an overhead 5-ton P. & H. electric crane equipped with a 1½-yd. Williams clamshell bucket and carried to a hoppered chute, where water is turned on this material, washing it to the boot of a bucket elevator, that discharges to a feeding device which in turn serves 16 concentrating tables.



General view of the new drier plant at the Charleston company's operation



Pulverizer grinding phosphate sands at the Charleston operation

Drying Equipment

The final sands from the washer will now have a B.P.L. content of from 72% to 78%

and considerable moisture, as the ground storage only permits the excess to drain off to waste. The same electric crane already described picks up this product and deposits it in bins at the end of the storage yard, where the sand passes to four Whiting Foundry Equipment Co.'s hand-fired, coal-burning dryers. The damp rock is fed to the cold end of the dryer at this plant, although this practice is not followed throughout the field, as some of the operators feed the material to the hot end.

Drying and Storage

The four dryers are driven by two 50-hp. General Electric company motors, which also drive a bucket elevator between each pair of dryers. This elevator elevates the material to a Hum-mer screen that discharges the fines and coarse to steel bins, from which the dried material is drawn into a steel, Koppel type car holding 8 yd., driven by a self-contained 10-hp. motor from two overhead trolley wires. The car conveys the material overhead to the top of the storage shed, where it is dropped to the proper storage space below. The car is manufactured by the Atlas Car and Manufacturing Co.

At the far end of this storage building is a separate bin that serves as a feed to a 5-roller, high side Raymond mill, that delivers the finely pulverized material to the box cars for bulk loading. The mill is driven by a 75-hp. General Electric motor through a 12-in. belt. The fan, a No. 11 exhauster, is driven by a 40-hp. General Electric motor with a belt drive. The vent from the Raymond mill exhaust pipe passes into the room over the fan and is not filtered through fabric filter bags, as is the custom in most installations using this equipment. However, the amount of dust from the vent is not large, judging from the amount visible. The pulverized material falls from the cyclone collectors through a flexible pipe to box cars.

Additional Grinding Equipment

At the end of the storage shed nearest the dryer the material can be passed, by means of the elevator, to an 18-in. horizontal belt conveyor that conveys the material over the track to a separate grinding building, where the sands pass over a Hum-mer screen. The fines from this screen join the discharge of the pulverized material produced by the two Fuller-Lehigh mills. This product is elevated to the top of the building by a bucket elevator, where it discharges to a screw conveyor that serves the storage bins, or it can discharge through flexible spouts to box cars.

The Fuller-Lehigh mills are driven by individual 75-hp. General Electric and Allis-Chalmers motors, respectively, by means of a 16-in. belt.

A plant of this size and character of operation must watch carefully all the various steps in the process from the pits to the finished product to see that a uniform product is obtained, and for this purpose the company maintains a chemical control and research laboratory.

Sales of Lime in 1929

THE sales of lime by producers in the United States in 1929 amounted to 4,260,000 short tons, valued at $33,387,000, according to estimates furnished by the lime manufacturers to the United States Bureau of Mines, Department of Commerce. This is a decrease of 4% in quantity of 8% in value as compared with sales of 4,458,412 tons, valued at $36,449,635, in 1928. The estimated sales of hydrated lime, which are included in these figures, amounted to 1,527,000 tons, valued at $12,566,000, a decrease of 5% in quantity and 7% in value from 1,612,818 tons, valued at $13,540,215, produced in 1928. The average unit value of all lime showed a decrease from $8.18 a ton in 1928 to $7.84 in 1929.

There was general report of poor demand for lime in 1929, especially for the lime sold for construction, and to a less extent for agricultural lime. Demand for chemical lime, although in some cases reported as poor, was reported by the larger number of producers as the same or better than in 1928. Lower or the same prices were reported by the larger number of producers, with a few reports of higher prices.

Sales of lime in 1929 for construction are estimated at 1,760,000 tons, compared with 1,986,465 tons, valued at $17,706,420, in 1928; for agriculture the sales are estimated at 300,000 tons in 1929 against 333,910 tons, valued at $2,287,558, in 1928. Sales of chemical lime are estimated at 2,220,000 tons for 1929, compared with 2,138,037 tons, valued at $16,455,657, in 1928. Included in the estimated sales of chemical lime in 1929 are sales of refractory lime (dead-burned dolomite) amounting to 483,000 tons, valued at $3,857,000. In 1928 this product amounted to $448,761 tons, valued at $4,283,036.

Of the 23 states leading in production of lime in 1929, 12 showed decreased output, 8 increased output, and 3 showed an output of practically the same as for 1928. Of these same states, 19 showed a decrease in value and 4 an increase compared with 1928.

Ohio, the leading state, and Pennsylvania, the second state in lime production, apparently each decreased in production by 6%. There was a decrease of 9% indicated in the output of hydrated lime in Ohio and of 5% in Pennsylvania.

Large Phosphate Developments Under Way in Florida

CONSTRUCTION of a $500,000 phosphate plant by the Southern Phosphate Corp. at Export, between Bartow and Mulberry, Fla., has been started, according to the *Tampa* (Fla.) *Times*. It is expected to be completed in about six months. The Southern corporation does both export and domestic business in mining and shipping phosphate rock of all commercial grades. It is a subsidiary of the Davison Chemical Co. of Baltimore, Md., with mines in operation at Pauway (Eaton Park) and San Gully.

The Export plant is expected to produce a superior grade of rock. It is said the site has a large amount of over-burden, but as the corporation has one of the largest draglines yet constructed now at work on the San Gully property that is not expected to interfere with successful mining operations.

Two other phosphate companies began construction last summer on plants which involve many millions of dollars. The two plants are those of the American Cyanamid Co. and the U. S. Phosphoric Products Corp. The initial cost of the former was estimated at the time of the announcement as between $3,500,000 and $4,000,000. Approximately $500,000 worth of land on both sides of the Alafia river was purchased for expansion of the Phosphoric company in connection with an industrial plant to cost approximately $4,500,000. Dredging of a three-mile channel 150 to 200 ft. wide at the bottom, running into the river, is part of the Phosphoric company's project, and construction of a channel 27 ft. deep, 150 ft. in width, 4000 ft. from the main channel, has been under way since summer, in connection with the Cyanamid company's construction activities.

LIME SOLD BY THE PRODUCERS IN THE UNITED STATES IN 1928 AND 1929

	1928			1929 (estimated)		
	Total lime		Hydrated lime	Total lime		Hydrated lime
	Short tons	Value	(short tons)	Short tons	Value	(short tons)
Ohio	1,013,676	$ 8,919,596	674,644	956,000	$ 7,800,000	614,000
Pennsylvania	834,050	6,119,036	273,973	780,000	5,800,000	260,000
Missouri	303,014	2,252,420	100,217	314,000	2,262,000	107,000
West Virginia	279,947	1,788,989	40,464	312,000	1,860,000	44,000
Alabama	192,364	1,407,232	34,376	200,000	1,400,000	35,000
Tennessee	183,541	1,238,945	69,721	175,000	1,096,000	47,000
Virginia	174,067	1,208,618	69,988	154,000	1,047,000	50,000
Wisconsin	163,965	1,374,749	11,560	136,000	1,132,000	12,000
Massachusetts	171,944	2,026,019	18,920	132,000	1,486,000	17,000
Illinois	115,523	1,017,001	31,214	121,000	995,000	36,000
New York	93,354	794,301	35,084	107,000	898,000	46,400
Indiana	107,209	734,915	41,664	107,000	688,000	47,000
Michigan	104,917	962,708	18,135	104,000	931,000	17,000
Maine	123,023	1,056,443	(*)	92,000	806,000	(*)
Texas	82,325	751,729	35,133	90,000	745,000	39,500
Maryland	59,508	440,886	29,091	55,000	410,000	35,000
Vermont	52,445	485,255	11,291	52,000	487,000	9,200
Arizona	36,244	343,167	(*)	50,000	473,000	(*)
California	60,751	617,472	14,245	47,000	492,000	10,000
Utah	47,662	385,476	(*)	46,000	365,000	(*)
Arkansas	40,438	339,624	(*)	34,000	283,000	6,300
Connecticut	48,152	529,936	(*)	32,000	360,000	(*)
Washington	24,529	265,922	(*)	32,000	321,000	3,400
Undistributed	145,764	1,389,216	103,098	132,000	1,250,000	91,200
	4,458,412	$36,449,635	1,612,818	4,260,000	$33,387,000	1,527,000

*Included under "Undistributed."

New Developments at West Penn Cement Co.'s Plant

THE TECHNICAL DIRECTORS of the West Penn Cement Co. have been responsible for the introduction of many new ideas and new equipment in the portland cement field. This plant, at West Winfield, Penn., was one of the first to use the large size 3-compartment compeb mills mounted on roller bearings and to install a kiln of such large diameter that it had to be assembled on the job (15 ft. maximum diameter). This kiln at the time of its installation was said to be the largest diameter of any in the world. The new crushing plant of this company was described in the May 11, 1929, issue of ROCK PRODUCTS, and the cement plant in the July 9, 1927, issue.

Chain Feeder Installed

After a review of the innovations that this company has adopted, it is not surprising to find it to be the first cement producer in the United States to install the Ross chain feeder, and it was primarily to see this feeder in operation that one of the editors of ROCK PRODUCTS made the trip to West Winfield.

The feeder is an English invention, now manufactured in the United States by the Ross Screen and Feeder Co., New York City.

To fully understand how the feeder is used at this plant, it will be necessary to recall that the crushing plant is situated about 1100 ft. from the cement plant and that only minus 2¾-in. limestone is used for cement rock, as the crushing plant also ships commercial crushed stone. The minus 2¾-in. stone is transported to the cement plant in open hopper-bottom, gondolas and spotted over a track hopper where they are dumped. A clam-shell crane redistributes the material over the small outside storage space under which runs a reclaiming tunnel. Through this tunnel passes a belt conveyor serving a 42-in. by 48-in. Jeffrey swing-hammer pulverizer, where the product is reduced to ⅝-in.

Steady Flow of Stone Assured

Stone formerly was fed to this belt by four vertical spouts, as shown in the illustration. Constant attention was required to get even a resemblance to a steady flow from these chutes, contrasting with the new feeder which requires no attention whatsoever. At the extreme tail end of the conveyor the Ross feeder has been installed so as to afford a steady flow from the track hopper immediately above, and at the same time to scrape the stone down to the belt.

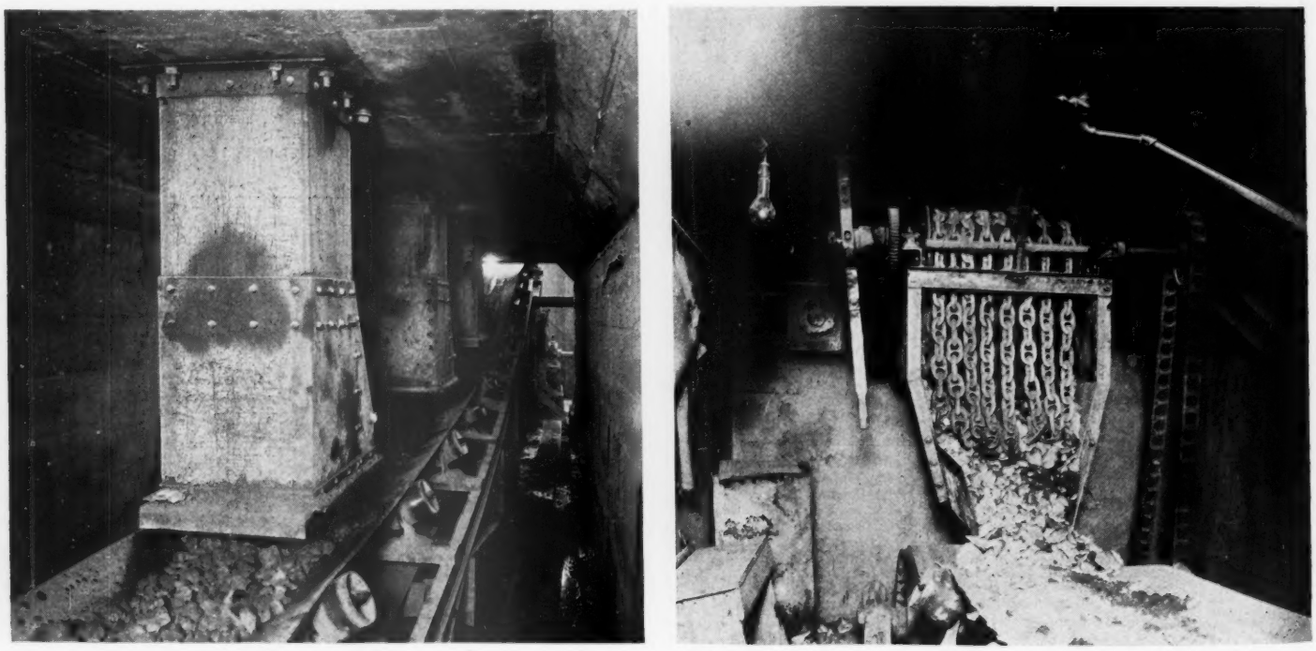
To some it might appear unnecessary to have a steady flow of comparatively small stone fed to a hammer mill, but here the discharge from the Jeffrey mill falls to a bucket elevator followed by a screw conveyor. It is to prevent overloading the screw conveyor that necessitated installing some reliable means of insuring a uniform mill feed rate. The superintendent, A. E. Hiscox, states that the Ross feeder comes up to expectations, delivering a uniform flow on both wet and dry material.

The feeder consists of eight endless chains, suspended from a cage-like pulley that is driven from the 30-in. belt conveyor tail pulley, and the chain's direction of travel is the same as the direction of travel of the stone. The mechanism is started and stopped by means of a jaw clutch. The chain links are made of ¾-in. steel with a cross web so that the links are non-kinking. The chute was also supplied by the manufacturers of the Ross feeder and was designed for this particular installation, although the feeder can be made to adapt itself to most any type of chute.

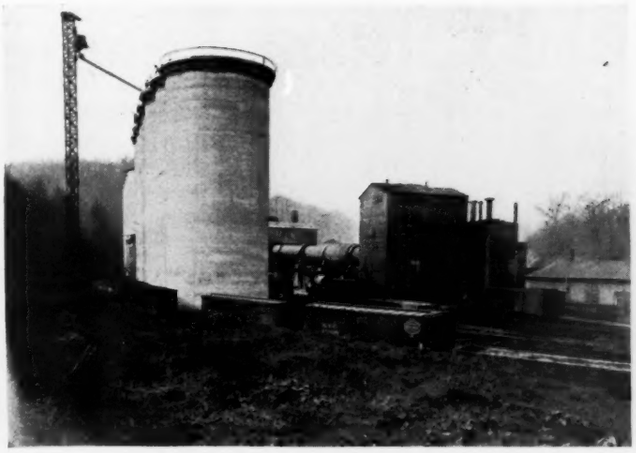
While this particular feeder was designed for small stone, the same feeder is manufactured to handle all sizes of stone from run-of-quarry to small particles. The size and type of chain used is governed by the size of the material being handled and chains from battleship anchor size to the smallest commercial chains are used for the various sizes of feeders.

Additional Storage Capacity

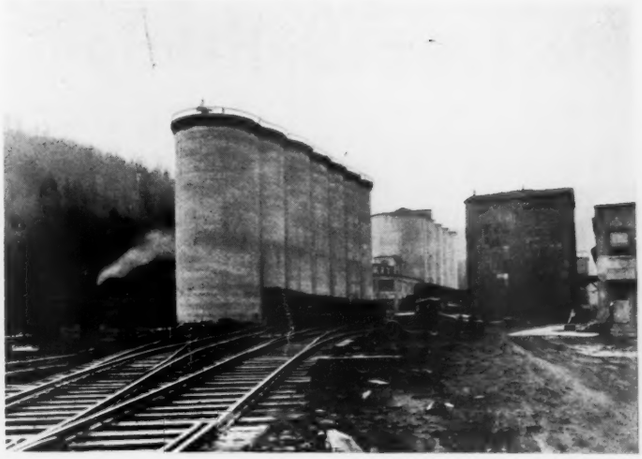
The Macdonald Engineering Co. is just completing four new silos which with the three interstitial bins will give the West Winfield plant an additional storage capacity of 198,000 bbl. The silos are 50 ft. in



The old method of feeding the belt conveyor serving the crusher (left) has been displaced by a single chain feeder installation (right)



The four new silos which with interstitial bins have added 198,000 bbl. of storage



The relation of the new storage with the old is illustrated here; the old silos are in the foreground

diameter by 90 ft. high, with an 11-ft. basement, and are of reinforced concrete throughout. A new pack house is also under construction.

The silos will be filled by Fuller-Kinyon pumps with the cement reclaimed by three type B, 7-in. portable Fuller-Kinyon pumps, mounted on suitable industrial trucks under the silos. The trucks run on three parallel tracks.

The pack house has four 4-tube Bates packers with the spill from each being conveyed by a series of screw conveyors to a small Fuller-Kinyon pump which returns the cement to the sacking hoppers.

The additional storage capacity and the very flexible means of filling and reclaiming will permit simultaneous sacking of four different lots of cement, and will speed up shipments from tested silos. Previous to this installation, only one lot could be sacked at a time, as the old equipment uses a series of bucket elevators and screw conveyors for reclaiming.

The West Penn Cement Co. has started the production of a high early strength cement that is a true portland cement and comes well within the specifications for that product. This new cement is marketed under the trade name of "Overnight" cement.

B. D. Phillips is president of the West Penn Cement Co., whose headquarters are in Butler, Penn.; F. C. McKee is sales manager; O J. Binford, general manager.

Comic Stage of Bell Cement Plant Fight

THE fight against the installation of what is known as the Bell cement plant near Los Angeles, Calif., has wearied that city by the columns of newspaper absurdities that have been published during the past year. Recently it was thought that the fight was over because the city council voted to permit the building of the plant.

The propagandists who worked in favor of the plant have all along insisted that the city would benefit because the plant was "outside the cement trust." It is certain that another cement plant in southern California is not needed at the present time, the capacity of existent plants being considerably in excess of what is needed to care for the southern California market. Hence it is reasonable to suppose that no present manufacturer would welcome another plant.

As soon as the permit was granted certain councilmen found that the whole fight was one of the deeply laid plans of the "cement trust." Accordingly a resolution was introduced to have the permit held up for further investigation.

The absurdity of such an argument verges on the comic, since it implies that the present manufacturers of cement would conspire to start a newspaper war that included a vicious attack on their business policy which has tended to lower the price of cement.

Record to Be Set in Expenditures for Public Works

CONSTRUCTION AND MAINTENANCE of public utilities totaling almost $7,000,000,000—a record figure—seems assured during the present year, Secretary of Commerce R. P. Lamont announced January 18, on the basis of stastistics compiled by the new public construction division of the Commerce Department. This total does not include residences, commercial and industrial structures and other private operations, which last year aggregated more than $3,000,000,000, it was stated.

Complete returns from the governors of 26 states, combined with conservative estimates based on partial returns from the remaining states, indicate probable expenditures for public works, including federal construction of $3,325,000,000 during 1930.

Programs for betterments to plant and equipment, announced by public utilities, railroads and telegraph companies, represent expenditures of almost an equal amount during the year, namely, $3,250,000,000.

Permanent Products to Build Buffalo Plant

PERMANENT Concrete Products Corp. of Columbus, O., a subsidiary of the American Aggregates Corp., Greenville, O., will build a Buffalo plant at 1275 William street, according to recent announcement in the *Buffalo* (N. Y.) *News*. Total expenditure in buildings and equipment will be more than $70,000, it is expected.

Construction of the first unit of the new plant will be started at once and it will be ready for production on May 1. Other units will be added during the year. The plant will be served by the Erie railroad, which is now constructing a siding for that purpose.

The company manufactures concrete specialties, particularly for use by railroads. Its major product at present is concrete slabs for paving grade crossings. The plant at Columbus, Ohio, was described in ROCK PRODUCTS, May 25, 1929. Fifty-seven per cent of its capital stock is held by the American Aggregates corporation.

Spray Process of Slurry Feed

Editor, ROCK PRODUCTS:

I note in your recent number of December 21, 1929, a reprint of my article on the "Spray Process of Slurry Feed." There is one point not made at all clear in the article, viz: that the process and its method of use are fully covered throughout the world by a number of patents of basic character under the control of Industrial Driers Ltd., of London, whose United States representatives are Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

In order to prevent the possibility of United States cement manufacturers inadvertently infringing these patents, I should be glad if you would kindly publish this information in one of your forthcoming issues.

INDUSTRIAL DRIERS LIMITED,
S. J. M. Auld, director.

Internationalization of the Portland Cement Standards—Part II

By Dr. C. R. Platzmann
Berlin, Germany

FOLLOWING the publication of an article in ROCK PRODUCTS, January 21, 1928, on the same theme, the writer has received letters from all parts of the world which indicate that there is a keen interest in an international standardization of portland cements by cement producers and consumers.

There is need of emancipation from a multitude of standard specifications; the specifications set up by each country often differ radically and tend to prevent a free movement of cement between countries. To approach a definite set of standard regulations governing portland cements produced in any country, efforts must be made to base these requirements on present available standard materials so that only the test methods and requirements need consideration.

Proposed International Standards

In the following an attempt is made to submit a proposition for such international uniform standards, realizing that this can be considered only as a first attempt in the indicated direction and that, when the problem is ready for decision, a practically utilizable result can be attained only by the common international co-operation of science, technique and commerce. There is no desire to create any kind of prejudice with the following proposals, especially since a problem of such outstanding importance can be furthered only by protracted negotiations, discussions and critical examinations.

In reference to the interpretation of the term portland cement, it may be permissible to recommend as a basis for this the German meaning which has been selected in various other countries. Whether it would not be worthy of recommendation, considering the present chemical composition of the cements, to increase the minimum value of the hydraulic modulus from 1.7 to 1.8-1.9, is a problem which remains to be settled. The majority of the countries which have cement standards have limited the maximum admissible magnesia content to 5%. There is no occasion to lower this figure, especially since not long ago American investigators proved that portland cement could stand harmlessly a magnesia content beyond 5%. The same applies to the maximum content of sulphuric anhydride; here also there would be no danger whatever with a 2.5% figure. Specifications which concern the specific gravity, the ignition loss and the insoluble residue can be considered as entirely unnecessary. With regard to the admixtures for special purposes, the almost universal figure of 3% can be retained.

Far-reaching conformity exists already in the following: the Vicat needle apparatus to determine the setting period; height of the test specimens is 40 mm. (1.6 in.) and the weight under which the needle is to test the cement pat is 300 gram (10.6 oz.). Far less harmonious are the specifications which concern the setting as such and furthermore the manner of determining the start of setting. Taking the latter point first, a perusal of existing specifications indicates that a rather large number of countries delay the start of setting to the moment when the needle no longer passes fully through the test specimen. It would be advisable to adhere to this practice. In reference to the actual setting period, one should confine himself to make a specification only for normal, therefore slow-setting, cement; the setting period starting not before one hour and terminating not after 12 hours. Special specifications for rapid and medium setting cements are entirely unnecessary at the moment, for according to the practice followed in many countries the portland cement evolved for special purposes as demanded by the consumer must be indicated as such.

An agreement on testing for soundness offers complications. Besides the cold-water test commonly prescribed in most of the countries, there are the hot-water test and the Le Chatelier tests. The 28-day cold-water test could be made obligatory, with one of the two other tests held as optional so that they would enjoy equal international rights.

Fineness

The degree of fineness of grinding must receive serious consideration in view of the recognized increase in quality as concerns strength. There will also have to be an agreement placing more severe requirements upon the degree of fineness in grinding, making residue on the 4900-mesh (178-mesh, American) screen and the amount retained upon the 900-mesh (76-mesh) screen obligatory, thus sharply defining the fineness of grinding. According to the grades of fineness reached in nearly all cements, 3% retained upon the 900 and 22% upon the 4900-mesh screen appears to be usual. As already pointed out in the first part of this article, the diameter of the screen wire is of less importance in creating uniformity; the mesh opening is of considerably more decisive importance. Those countries which go by the width of mesh of their screens prescribe for the 900-mesh screen one of 0.222 mm. (0.00874-in.) and for the 4900-mesh screen one of 0.088 mm. (0.00346-in.).

The test for compressive as well as that for tensile strength will have to be binding, both being based on a 1:3 mix. In order to get real comparative figures, the preparing of the test specimens by hand instead of by machinery will have to be excluded. Hence all test specimens should be made with either the Steinbuck-Schmelzer mortar mixer; for ramming the Boehme-Martens hammer apparatus and the Klebe dropping ram are recommended. Long-time test data are readily available, so figures need be standardized only for the strengths obtained with the hammer apparatus. Test specimens which are made with the dropping ram should give 20% greater strength than those made with the hammer apparatus.

Mortar Strengths

Based on these assumptions, the minimum strengths of mortar specimens so prepared should be:

Age	Strengths — Tensile kg./cm.²	Tensile lb./in.²	Compressive kg./cm.²	Compressive lb./in.²
1 day moist closet plus 6 days under water	18	256	180	2561
1 day moist closet plus 27 days under water	30	427	275	3911

An optional compressive strength of 350 kg./cm.² (4978 lb./in.²) for the combined storage can be used.

The screen size of the standard sand to be used in making the mortar specimens is of great importance. For this purpose the material passing a screen with 1.35 mm. (0.053-in.) openings and retained on a screen of 0.775 (0.031-in.) openings is best suited. This sand specification is quite similar to that in use in the United States; the Ottawa sand used there is that which passes the 20-mesh sieve and is retained on the 30-mesh sieve.

Customary specifications governing the amounts of mixing water may be retained; the hammer apparatus should make water appear between the 90th and 110th blow. If the ram is used, the Austrian-Polish-Swiss mortar consistency standards can be followed.

The suggestions offered above for the

creation of international standards are of course confined to portland cement and all other cements such as slag cement, blast furnace cement, high-early strength cement or alumina cement are not considered. When the importance and production of these latter increases international specifications could be provided for them. For cements made from blast furnace slags there would have to be merely a suitable change in definition, and for the early high strength cements the specifications for fineness in grinding and for strengths would have to be adjusted. Because of their totally different chemical composition and chemical hardening, entirely new standards would have to be provided for the classes falling into alumina cements.

Delivery Under "More or Less" Contract for Sale of Cement

By Leslie Childs

WHERE A CONTRACT for the sale of cement to be used upon a particular job is entered into, and the quantity to be delivered is named, followed by the phrase "more or less," a material rise or fall in the price of cement may easily lead to dispute over what is to be delivered. In other words, whether the quantity named, or the buyer's requirements for the particular job will govern, in view of the use of the expression "more or less" in the contract.

As may be expected, this question of the law of sales has been the cause of considerable litigation, but the subject cannot be covered by any hard and fast rule, because each case of this kind has been decided on its facts. However, generally speaking, where a purchase is made for a particular purpose, and the buyer is obligated to use only material from the seller, a "more or less" provision will give the buyer a right to his requirements at the contract price.

Needless to say, this is an important point for contractors, dealers and buyers and sellers of cement in general, and should not be overlooked when contracts are being entered into. And, as an example of the application of the rule announced, the Oklahoma case of Sherman M. & L. Works v. Carey, Lombard, Young & Co., 227 Pac. 110, is worth examination.

Contract for Cement Entered Into

In this case the defendant required a large quantity of cement in the construction of a waterworks contract. The exact amount that would be required was not known, and in this situation defendant contracted with the plaintiff for "600 bbl. (more or less) O. K. portland cement * * * at $3.82 per bbl." The contract also provided that it was for exclusive use in the named work, and in addition stipulated:

"The buyer (defendant) hereby represents that he now has a contract to do the work specified; and in consideration of the special conditions upon which the cement is sold, the buyer agrees that none of said cement shall be resold or loaned or used for any purpose other than those herein specified, and the buyer further agrees that no other brand of cement will be substituted in the work above specified."

After the plaintiff had furnished the defendant 788 bbl. of cement, the market price took a jump until the cement actually cost the plaintiff $4.41 per bbl. In this situation, the plaintiff added 20 cents and proposed to charge the defendant $4.61 for any additional cement furnished under the contract.

The defendant did not agree to this increase, but the plaintiff continued and shipped 129 bbl. after this, which was required by the defendant on the work. Following this, final settlement day arrived, and the defendant refused to pay more than $3.82 for this cement, taking the position that under the "more or less" clause of the contract he was entitled to his requirements for the work at that price.

In reply to this, the plaintiff contended that in furnishing 788 bbl. of cement it had fully complied with its contract to furnish "600 bbl. more or less." By the same token, plaintiff took the position that it was entitled to the advance in price for the additional 129 bbl. furnished, regardless of the fact that defendant required them in the work. A lawsuit followed, and in passing upon the question raised, in the light of the facts reviewed, the court reasoned as follows:

The Language of the Court

"Where the purchase is for a specific purpose and for a particular individual to be used for a certain and definite purpose, all of which facts are made known to the seller, and especially in contracts such as the one with which we are dealing, wherein the purchasers agree to use no other brand of cement in the construction of the plant which he has agreed to build than that brand of cement manufactured or furnished by the seller, then the amount of material necessary to complete the job or contract of the purchaser becomes the essence of the contract, rather than the specification, wherein a certain amount of material is designated, more or less. * * *

"We think, under the terms of this contract, the defendant was entitled to all the cement of the brand specified in the contract, and at the price specified in the contract necessary to complete the waterworks improvement and filtration plant at Lindsay, Okla. * * *"

So, that was that, and in conclusion the court reversed a judgment which the plaintiff had obtained in the lower court upholding the increase in price on the 129 bbl. of cement furnished. Holding, as outlined in the opinion, that in view of the terms of this contract, taken with the "more or less" provision therein, the defendant's requirements constituted the measure of delivery involved rather than the number of barrels named in the contract.

Summary

As noted in the beginning, each case of this kind must necessarily be decided in the light of its facts, and the wording of the contract involved. It follows, the foregoing case is not put forward as amounting to a general rule that would apply in all cases.

Nevertheless, it constitutes a well reasoned holding on the legal construction of the phrase "more or less," when this phrase is read with the other terms of the contract, and fairly illustrates circumstances under which the use of this phrase will entitle a buyer to his requirements for a particular piece of work. The case is clearly one of force and value on the point decided, and in view of its subject matter one that buyers and sellers of cement in general may with profit be familiar with when "more or less" contracts of sale are being entered into.

Trade Mark "Rock Cork" Not Misleading

THE decision of the Examiner of Trade-Mark Interferences dismissing the petition for cancellation of the mark "Rock Cork," in which the word "Rock" appeared above the word "Cork" and the letters "O" and "K" were enlarged so as to serve as parts of both words, used as a trade mark for insulating material of mineral origin, was affirmed, it being found that the petitioners had not used a similar mark or notation.

This case came on for review, on appeal of the petitioner, Armstrong Cork and Insulating Co., of the decision of the examiner of trade-mark interferences dismissing the petition and recommending that the registration of the Banner Rock Products Co. be not cancelled.

The petitioner was overruled in its contention that the mark should be cancelled because of deception of the public incident to the use of the word "cork" in the trade mark, whereas there was no cork present in registrant's goods, First Assistant Commissioner Kinnan stating that the decisions make it plain that such deception would not sustain a petition for cancellation or a suit for infringement.—*U. S. Daily.*

Airport Construction and Maintenance*

By W. A. Hardenbergh
Associate Editor, "Public Works Journal," New York, N. Y.

AIRPORT CONSTRUCTION and maintenance will afford, in 1930, a greater field than ever before for the construction industry. Nor will the field be a narrow one, in which but one or two lines of construction will find opportunity to partake. The work necessary in the construction of a modern airport includes clearing and grubbing, grading, paving and construction of runways, drainage, water supply, sewerage, lighting and power and housing. In addition, in many instances, the airport itself will be but a nucleus around which other construction will center, or it will be a primary cause of added construction.

The greatly increased activity that will take place during the coming year is due, primarily, to the rapid growth of the aviation industry. More airports are now necessary, just as a generation ago, more roads were necessary; and also, as has been the case with roads, it is now necessary to provide for traffic both heavier and of greater volume. Airplanes are becoming more numerous, transport planes are becoming heavier and passenger planes are demanding smoother take-off and landing facilities. These combine to require more airports and an added degree of construction refinement and facilities.

We may therefore classify proposed airport construction activity under two heads: (1) new construction; (2) improvement of fields now in use.

New Construction

Volume—The increase in the volume of airport construction is best reflected by figures which have been prepared by the Aeronautics Branch of the Department of Commerce. As of January 1, 1929, there were on record as proposed for construction in 1929, 899 airports. As of December 4, 1929, there were on record as listed for construction in 1930, 1361 airports. This represents an increase in the total number of airports to be constructed of 51%; but the real increase in dollars and cents of work done will undoubtedly exceed this percentage materially, because the airport of 1930 represents a considerable increase in size, capacity, safety and completeness over its predecessors, even those of a year ago.

Costs—To get an idea of the amount of work involved in these figures, we may ask: "What do airports cost?" There is, of course, no real standard of measurement; yet figures are available from a large number of cities where both municipal and private airports have been constructed within the past year or so. Reports from 17 cities, having a total population of more than 10,000,000, show a per capita cost of somewhat more than $2.50 for airport construction, with a variation ranging from slightly over $1 per capita for Richmond, Va., Chicago, Ill., and Boston, Mass., to $10 for St. Paul, Minn., and $14 for San Diego, Calif.

Construction Volume—Based on these figures, we may estimate the probable expenditure for airport construction in 1930 at not far from $75,000,000 exclusive of improvements to fields now in use.

Over 1500 Fields in Use

Fields in Use—Last year, for the first time, commercial fields reached a par in number with municipal fields. At the end of 1929, there were in existence 1561 recognized airports of all types, of which 84 were army, navy and other governmental fields; 528 were intermediate and auxiliary fields, 458 were municipal fields and 491 commercial fields. It may be expected, therefore, that during 1930 the bulk of construction will be in commercial fields. In general, the municipal field was designed to fill the gap until the commercial field became feasible financially. In many places this is a fact, and consequently the volume of municipal fields may be expected to decline, though many fine municipal fields are now being built.

Improvement of Fields Now in Use

Factors in Increased Expenditures—The principal factors which tend toward increased expenditures for airport construction in 1930, aside from the increased number of airports projected, are those which result from the necessity of making airports better able to handle the rapidly increasing volume and weight of air traffic. These include grading, drainage, paving, lighting, building and similar features. Some or all of these become necessarily built when the emergency landing field, or the Class C or D airport, is made over to meet the requirements of new air mail or transport lines or increased volume of air travel.

Grading—In constructing an airport, the field should have a grade not exceeding 2½% and preferably not over 2%. In some sections of the country, where large areas of level land are common, grading does not involve any considerable expenditure; but in most places it is an important item. In the construction of the Akron airport, the grading amounted to 1,300,000 cu. yd., on which the price was 34c per yd.; the rolled embankment amounted to 90,000 yd., on which the price was 22 cents a yard. The grading work at Port Columbus, Ohio, cost only $31,500 for clearing and grading, which is comparatively low. Thus the cost varies with individual cases, but on the average airport may amount to a considerable figure. Much depends upon the topography as to the cost and the equipment that must be employed, but usual types of earth moving apparatus are ordinarily suitable for the work.

Drainage

Drainage—Drainage may be classified as an essential factor in any airport. The surface of the ground must be firm at all times. Water cannot be allowed to remain on the ground even for a day. Airport drainage must be designed so as to be able to carry away water from the landing areas as fast as it falls. In many cases subsurface drainage also must be provided in order to control the ground water. At the Columbus airport subdrainage lines were built at 30- to 60-ft. intervals. In all, about 32 miles of drains were built.

Without adequate drainage, airports may be out of service or unsafe for one-fourth to one-third of the time.

The costs of drainage depend much on local conditions, but standard practice in design and construction of storm and underground drainage should give reliable information on this point. At Port Columbus, Ohio, drainage costs were about 11.5% of the total cost of $800,000. At Akron, subdrainage was not needed, but the storm water drainage system is reported to have cost $180,000. On the great airport being constructed outside of New York on the Jersey meadows drainage will be an important consideration.

Paved Runways in Demand

Paving—Increased traffic and the heavier transport types of planes being put into service is now resulting in a marked demand for paved runways. These are needed so that shorter take-offs will be possible; also the air-traveling public demands better landings and take-offs. Paved runways for the airport should be at least 100 ft. in width, and the minimum length under most conditions is 2500 ft. Paving such a runway requires in the neighborhood of 28,000 sq. yd. of paving, and where two or more runways are to be paved, this amount will be increased accordingly. At Port Columbus, Ohio, asphalt on a concrete base was used, and the cost for two runways, totaling

*Paper read at the recent annual convention of the American Road Builders' Association, Atlantic City, N. J.

over 90,000 sq. yd. of pavement, was $135,000.

In the past, relatively few airports have had paved runways, but the indications point plainly to the fact that in the near future dustless and substantial runways suitable for all kinds of weather conditions will be required; paving is even at present almost an essential in the better fields. What the type of paving will be we cannot now say, but the type chosen will have to be capable of withstanding heavy loads traveling at high speed. In other words, it will be a hard surface, high cost pavement.

Water Supply and Sewerage

Water Supply and Sewerage—With passengers and employes in increasing numbers at airports, provision for water supply and sewerage must be made. Airports are frequently beyond the economical reach of water and sewerage lines from nearby cities, and generally they must be provided with water supply and sewerage systems of their own. Frequently treatment plants must be provided. The costs for these facilities depend entirely upon local conditions.

Lighting—With the great increase in night flying, lighting has become an essential. Marking of the edges of the landing field and of obstructions flood lighting; and many special devices for aiding the flyer are now common. The construction of such lighting equipment represents a very considerable cost. The Department of Commerce estimates that the cost of constructing a lighting system for a field of standard size and construction will run from $12,000 to $35,000 and average around $25,000.

Housing—In addition to the cost of building the hangars, there is also the expense involved in the construction of the shops, houses for pilots and personnel, buildings for restaurant and hotel facilities, etc.

Other Construction—A heavy traffic high-speed type highway is generally a requisite for communication between the airport and the city it serves. Frequently it is more economical to build such a road than to locate an airport near an established good road, where land prices may be high or where the road already carries maximum traffic. Provision for parking automobiles should be provided, dependent upon the size of the city and traffic past the port. A recent tendency is to provide recreation facilities, such as tennis courts and swimming pools at airports

Summary—Airports to be constructed in 1930, numbering nearly 1400, will exceed by 50% the number constructed last year. In volume of work such new construction will be considerably greater. In addition to the work resulting from new airports there will be a large amount of work necessitated by improvements to existing airports, such as paving, water and sewerage, drainage and improved lighting and housing, all of which will be materially greater than that of 1929.

Trade Associations Unite Efforts to Speed Residential Building

PLEDGING their combined resources in a united program to promote home building throughout the nation, representatives of more than 60 trade associations and other groups allied with construction laid their plans for accelerating building activities before government representatives at the National Business Survey Conference, called at the direction of President Hoover at the Chamber of Commerce of the United States, January 21.

Emphasizing the necessity for unified action, the group proposed that various field men be utilized from their respective organizations for state campaigns and that in addition $500,000 be spent during the year in national advertising and other media for disseminating information before the public.

One of the first things the construction industry must do, the group decided, is to assure the public that basic conditions in the United States are sound and that prospective home owners can build with security. The financial problem must be ironed out, it agreed, so that money at favorable rates is available for home construction, and a widespread promotion of home building, it believed, would tend to stimulate the flow of money for this purpose.

Mr. Lamont Speaks

The Secretary of Commerce, Robert P. Lamont, in addressing the group pointed out that 70% of our national expenditures is for other than necessities and suggested that the construction industry consider the possibilities of swinging some of that percentage in the direction of home owning.

The secretary stressed the importance of financing home builders and cited the methods of automobile manufacturers in selling cars as an aid that might be applied in selling homes. Home ownership, he said, contributes to better citizenship and gives a man a better status in his community.

Points to Higher Costs

At the same time, the secretary observed, the curves of major commodity prices since the pre-war period show that many items have increased little and some, notably automobiles, have showed a townward trend, "but the cost of building a house has gone steadily up and may be one of the causes for the $800,000,000 falling off in home building last year."

Referring to the present need for homes he told the group that it is "your job to survey the market and to see what you can do to widen the demand." In this connection, he stated that there is "a real need for agencies from which home owners can obtain disinterested advice."

Dr. John M. Gries, chief of the new division of public construction of the Department of Commerce, explained the efforts of the government to remove those barriers that interfere with or delay contemplated construction.

Construction Expedited

"Federal, state, municipal and county governments are busy pushing projects out into the construction current daily. Many projects which had been planned had not been launched. Some were lodged on rocks. Others were in still water, while still others had sunk. Everywhere," he told the group, "public officials responsible for construction are installing work that had been planned and are trying to remove restrictions, so that work may go ahead uninterruptedly and at an early date. Their efforts," he said, "are meeting with success."

Dr. Gries declared that a few hundred million of dollars of construction work had been expedited by the national emphasis on building acceleration and said that the public recognizes the construction industry as the balance-wheel of American business. "The construction industry," he told the group, "has been chosen to play ball for the American people and to keep business good."

Question of Financing

The question of financing was characterized by the conference as an essential factor in the promotion of home building. William C. Koch, representing the American Face Brick Association, declared that the industry "must become the big factor force" to provide that finance and suggested that money be incited into building securities and that advantage of home security investment be taken by potential home owners.

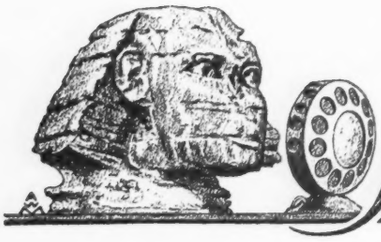
B. J. Mullaney, representing the American Gas Association, pointed out that the manner in which recent bond issues have been subscribed at favorable rates is a good sign that money conditions are becoming better. He suggested that widespread effort be made to inform the public that now is the time to build and that this idea be put forward.

No indication of curtailment is visible in the gas industry, he stated, the construction budget for the year being $425,000,000 besides $50,000,000 for maintenance. Half of the larger amount, he said, is for material.

Special Committee Proposed

It was suggested at the conference that a special committee be appointed to drive forward the building program of the government, and that this body co-operate with the Secretary of Commerce, Mr. Lamont, and the Secretary of the Treasury, Mr. Mellon, in carrying out this program.

It also was suggested that the financial leaders of the nation confer with President Hoover with the view to provide ample financing for building purposes.



Hints and Helps for Superintendents

Barge Loading Conveyor

THE plant of the Ross Island Sand and Gravel Co. is built on pilings on the Willamette river, which flows through the heart of Portland, Ore. About 50% of the company's business is delivered by barges that can be loaded by a scow from a semi-submarine stockpile or can be loaded from

Movable conveyor loads barges from any of the bins

bins over which rest the screening and washing plant.

A channel has been dredged alongside the plant so that barges and two boats of reasonable depth can draw up for loading. To enable loading of the aggregate to the center of the barges a short movable belt conveyor has been provided which with its drive motor rides on an "I" beam; the outboard end of the conveyor is supported by three wire cables that extend back and upwards to a second trolley. The upper trolley runs on a second rail. By the use of this piece of equipment sand or gravel from any of the bins can be deposited to the barges by simply shifting the conveyor to the proper bin gate as needed.

Auto Car for Quarry Deliveries

WHERE quarry haulage is by means of electric motors with overhead trolley wires, it is usually necessary to take down the wire before shooting primary blasts, especially if the blast is of large size. This naturally entails a considerable amount of overhead work, and to expedite this work a raised platform is provided at the Naginey, Penn., plant of the Bethlehem Mines Corp. The platform is mounted on a small industrial truck which is moved from place to place by a remodeled Paige auto car equipped with flanged wheels. This car enables the electrical crew to take down and replace the copper trolley wire in a minimum of time. The car also provides a ready means of transferring small items, such as drill steel, hammer drills, tools, etc., to and from the quarry.

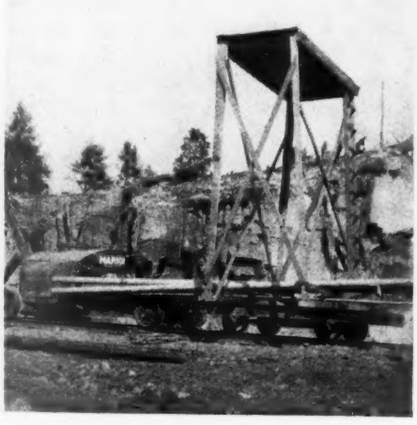
Some Hints on Truck Maintenance

By F. J. MACDONALD
Beacon, N. Y.

AT MANY rock products plants some form of truck is used for transportation. The problem of keeping them just fit for daily service many times puzzles the repair mechanic. A rather peculiar case came under my care a short time ago (while holding down a mechanic's job) at a large sand and gravel plant near Beacon, N. Y.

One of the old Pierce-Arrow trucks developed a skip. The assistant mechanic gave it a "going over" without results. The ignition system was an Eiseman magneto. Some new wires were placed, a new plug, and the valves examined, with the same results—a skip in the No. 3 cylinder. The problem resolved itself into this—if the magneto was weak or at fault, why shouldn't some of the other cylinders skip as well as No. 3?

As the truck was in daily operation and could not be spared very long, it was up to somebody to find the trouble during overtime. It surely was a puzzle, but something had to be done, and so we went at it with determination. The valves were fine and compression perfect on all fours. After a very thorough examination of the magneto distributor cap a short crack was discovered, extending down from the No. 3 distributor point to the frame, about ¾ in. long. To think that a high-tension spark would follow such a small crack rather than jump a short gap in the plug seems rather unbelievable, but such was the case.

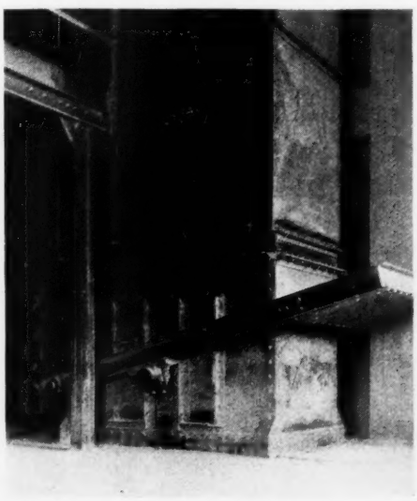


Auto car adapted to quarry tracks proves useful

The next problem was how to make repairs. By telephoning a service station several miles away it was discovered that they had no extra distributor cap. An order for one meant another delay, so I decided on a quick repair. A light pointed iron was heated in the forge to dull red and burned or melted its way down in the crack of the hard rubber cap. The crevice was well fused or melted full of the sealing material from the top of a dry cell battery. When through, the crack was entirely eliminated and we soon discovered that our efforts were not without avail, as the truck started off very nicely and ran the rest of the season without any more trouble.

Elevator Takeup

THIS is not the only elevator takeup of this type in use but one of the few so located that a picture could be taken. All the others were off in the corner or in



A bucket elevator takeup

the bottom of a dirty pit where photographic efforts are useless.

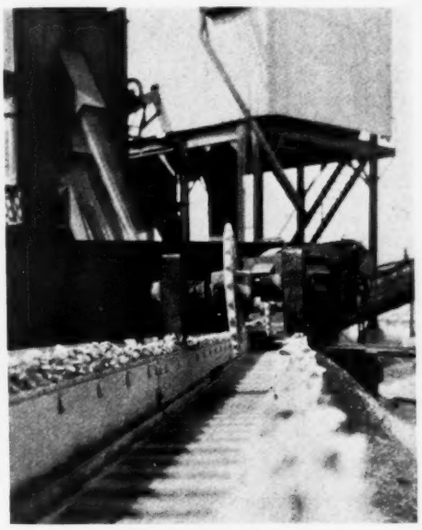
The lower carrier pulley of the bucket elevator has its bearing bolted to the two side arms which are hinged at the lower end. The arms are connected at the

higher end so as to form a platform or box-like receptable in which can be placed weights to offset the slap of the bucket chains and yet provide sufficient "give" for the digging effect.

This takeup is used at the plant of the Santa Cruz Portland Cement Co., Davenport, Calif.

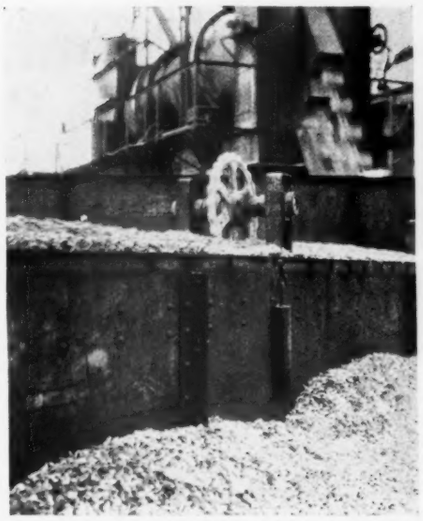
Drag Conveyors

AT THE new asphalt mixing plant of the Marble Cliff Quarries Co., near Columbus, Ohio, the sand and crushed limestone used is conveyed to the dryer by two drag conveyors. This piece of equipment works very satisfactorily on the sand, but when used for coarser material there is a decided tendency for the chains to work upward, and, instead of the rock riding the conveyor, the conveyor rides the rock. This, of course, increases the power requirements and reduces the capacity as well.



Sprocket idler holds drag conveyor in place

To overcome this tendency for the chains to work up in the rock load, sprocket idlers were mounted so as to ride the top of the chain, the idlers not being placed in a fixed position as regards vertical movements, but free to move in that direction. Counterweights on each side of the idler were added for additional weight.



Showing the sprocket idler and extra counterweight

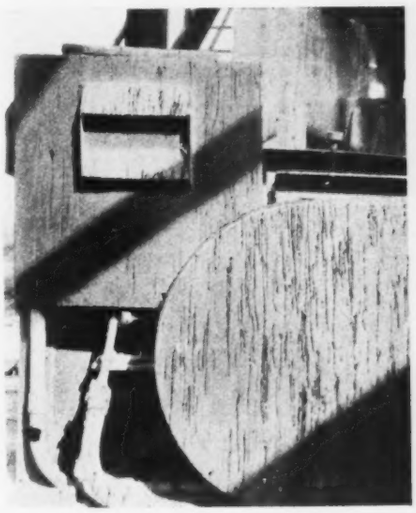
Stripping of Heavy Clay Overburden at a Quarry

THE Lojo Kalkverk A. B., Finland, has a stripping problem of unusual difficulty, consisting of the removal of a tough clay with embedded rocks from above its limestone quarry, and since early in 1928 has been removing this material with a 2½-yd. "Crescent" power drag scraper with Sauerman belt-driven power unit. Since the time this machine was put in operation it has been used in two different set-ups, the first, used during 1928, being shown in one of the accompanying views. In this installation the scraper was set up to strip off the overburden from a section of the quarry adjacent to the railroad and drag the material up a ramp to load it into railroad cars.

Early in 1929, the company changed this operation so that now the stripping is being conducted at right angles to the former line of operation, the scraper dragging the overburden into a windrow of high spoil piles along one side of the quarry property. As seen from the other illustration, the scraper is working against a rugged bank and is taking off a layer of earth of considerable thickness. Because of the hard digging the scraper wears out a good many digging teeth, but it handles the material without difficulty.—*Sauerman News.*

Electric Motor Housings

WHERE a machine installation is enclosed in a building reasonably free from dust or dirt, the advisability of enclosing a motor in a protective housing is questionable. At a plant recently visited by one of ROCK PRODUCTS' staff, most of the equipment was out in the open, and all the various motors were protected by substantial and well built covers of $\frac{3}{16}$-in. sheet iron with welded joints.



A neat electric motor housing

On all four sides of the housing were two louvres for ventilation and a removable top for inspection and oiling purposes. The whole installation makes a very neat appearance, as well as an excellent protection.

Quarry strippings are loaded direct to a railroad car by means of a ramp and hopper

Stripping heavy overburden at a Finnish limestone quarry with a 2 1/2 cu. yd. power drag scraper

Nonmetallics Have Prominent Place in Mining Engineers Program

By Oliver Bowles

Chairman, Committee on Nonmetallic Minerals, American Institute of Mining and Metallurgical Engineers

THE ANNUAL meeting of the American Institute of Mining and Metallurgical Engineers, which has a total membership of about 9000, will be held at Institute headquarters, 29 W. 39th Street, New York City on February 17 to 20. At this meeting an interesting program of papers on nonmetallic subjects will be provided. The Committee on Nonmetallic Minerals has a membership of 45. The membership is not only distributed geographically to represent all sections of the country, but the choice of members had in view also an adequate representation of the various branches of the nonmetallic mineral industries. Four subcommittees cover the major branches. (1) Crushed stone, sand and gravel, (2) cement, (3) lime and gypsum and (4) clay products. A general committee is made up of those who have a wide but less specialized interest.

Program

Through the active co-operation of the committee a program has been proposed which will occupy two sessions. Following is the program as now tentatively arranged.

MONDAY, FEBRUARY 17

10 a.m. Room 502. Oliver Bowles, Chairman; A. C. Avril, Vice-Chairman

An Application of the Wire Saw in Marble Quarrying, by W. M. Weigel.
Limestone Quarry at Northampton plant of Atlas Portland Cement Co., by L. James Boucher.
Hydration Factors in the Gypsum Deposits of the Maritime Provinces, by H. B. Bailey.
Status of Phosphate Industry of Western United States, by Frank Cole.

2 p.m. Room 1101. W. M. Weigel, Chairman; A. C. Avril, Vice-Chairman

Quarrying of Limestone at Lime Spur, Montana, by P. F. Minister.
Outstanding Developments in the Nonmetallic Mineral Industries During 1929, by Oliver Bowles.
Written and Oral Discussion.

Wire Saw in Marble Quarrying

The first paper of the morning session describes and illustrates the operation of a wire saw in a marble quarry in Arkansas. The subject is of special interest at this time because while the wire saw has been remarkably successful in the slate quarries of Pennsylvania, it has not met with equal favor when tried in marble. Some marble companies have found the cutting rate to be too slow for practical use. At this particular quarry in Arkansas, however, fair success has been attained. W. M. Weigel, mineral technologist with the Missouri Pacific Railway, and vice-chairman of the Committee on Nonmetallic Minerals, has covered this subject in his usual lucid and interesting style, and the paper should be of interest to all producers of dimension stone, or to those interested in any way in wire saw operation.

Large Quarry Operations

The second paper comprises a detailed description of quarry operations at the Northampton, Penn., plant of the Atlas Portland Cement Co. The production capacity of this plant is 20,000 bbl. a day which requires about 5,500 tons of rock. The quarry operation providing this large tonnage is described in detail under such headings as stripping, drilling, blasting, loading and crushing. The pulverizing of the raw rock, the calcination, and the handling and grinding of the clinker are also covered. The author, L. James Boucher, is assistant plant manager; the descriptions may therefore be considered as unusually authoritative, being written by one who is in contact with the operation every day and thoroughly familiar with all the problems involved.

Hydration Factors in Gypsum Deposits

The paper on hydration factors in the gypsum deposits of the eastern provinces of Canada was written by H. B. Bailey, a geologist who has devoted much intimate study to the conditions governing the hydration of anhydrite in nature. Much has been written on this subject from a theoretical or laboratory basis, but this paper deals with the natural processes of hydration as observed by the author. The results of his study are of practical value to present or prospective operators for they point out the most favorable hydration conditions providing bodies of gypsum of sufficient size for commercial exploitation. Lateral hydration and top hydration are the most important. A bare outcrop is not a favorable condition for the gypsum will dissolve or erode away as formed. A blanket of clay 20 or 30 ft. thick is a most favorable condition for it holds moisture in close and constant contact with the anhydrite, and at the same time prevents removal of the gypsum formed.

Western Phosphate Industry

The paper on the phosphate industry in the west is of most importance to those interested in fertilizer problems. Emphasis is placed on the great extent of the deposits in the west as compared with those in Florida and Tennessee. Development of the western deposits is hampered by limited markets. It is pointed out that the state of North Carolina used twice as much commercial fertilizer in 1928 as the total of 22 western states. Fertilizer products from the western deposits can reach eastern markets only in the condensed treble super-phosphate form. Sulphuric acid obtainable as a cheap by-product at some of the smelters favors such manufacture. There is a growing demand for fertilizer materials in the west, and therefore, the western phosphate industry has the prospect of future expansion.

Glory-Hole Limestone Mining

The afternoon session will begin with the paper on quarrying limestone at Lime Spur, Mont. The paper covers a very interesting method of glory-hole mining in a high calcium stone associated with dolomitic beds that had to be avoided. About 56% of the product is plus 3-in., and is sold to sugar factories, while the minus 3-in. is sold as concrete aggregate. Methods of obtaining a maximum of the more profitable plus 3-in. stone are discussed.

It is expected that the major part of the afternoon session will be devoted to a round table discussion of the final paper on outstanding developments in the nonmetallic mineral industries during 1929. This paper is not to be regarded as an individual contribution, for many members of the committee worked with the chairman in providing material that was assembled and published in the January number of *Mining and Metallurgy*.

Other significant facts have been submitted since the paper was published and these will be presented as written discussions. A wide range of subjects is covered and it is hoped that many of those who are primarily interested in nonmetallics will be present to take part in the discussion. In this age of rapid advancement and new discoveries it is imperative that engineers and operators keep closely in touch with all significant events. The opportunity is here offered for concentrating the discussion of many such events into a short space of time.

Preprints of any of these papers may be obtained from the secretary at the address given in the opening paragraph. Written discussion may be sent to the secretary prior to the meeting and oral discussion at the meeting will be welcomed in so far as time permits. It is hoped that many readers of Rock Products will come prepared to contribute ideas based on their experience.

Editorial Comment

A woman writer in a recent issue of *Harpers Magazine* compares American and European safety methods and legislation, giving the preference to European methods. European governments *compel* manufacturers to adopt safety methods by legislation. In America there is less compulsory regulation and a great deal of educational work through trade associations and such bodies as the National Safety Council, and government bureaus. The writer referred to admits that progress has been steady and rapid in the United States, but points out that it has been uneven, some industries lagging behind others, and individual plants in certain industries being woefully behind the average.

Safety in Europe and the U. S.

European safety methods cannot be compared with American any more than European methods in dealing with other industrial matters. Safety methods have a far different appeal to the settled society of any European country than they do to the Americans who are, in general, only one generation away from the pioneers. To live in danger and to disregard the hardships of severe weather, poor housing and scanty and monotonous food were long a part of the American tradition, brought about by the conquest of forest, prairie and desert. The earliest industrialists of this country were looked upon as hard men, and many of them were. But, generally speaking, they were harder on themselves than their employes, and they did not ask their men to do what they themselves would not do in the same circumstances.

American industry has been severely criticised in the past for its waste of men and materials, and from the foreigner's point of view the criticism was justified. But it is highly probable that the success of American industry would not be so envied by the rest of the world had it not been for the American pioneer that disregarded everything but the eventual success of the business. Our industrial pioneers had to cope with insufficient capital, inadequate technical knowledge, high transportation costs, far-flung markets, and other handicaps, and meet the fiercest sort of competition at home and abroad. It is small wonder that safety and welfare work were looked upon as frills, when all the capital and effort that could be had was needed to keep the business going and provide for expansion.

This is all in the past. But before the mental attitude of American industrialists regarding safety methods could be changed much education was necessary. So the agencies for education were started, and their success has been little short of a miracle. Men in the prime of life can remember the change by which safety methods were lifted from the lowest to the highest place in their consideration. Today all intelligent industrialists are of the same opinion. But without this educational work coercive legislation would have been futile. Some of it that was tried experimentally was futile.

Education Rather Than Coercion

Advances in equipment design make demands on labor which are sometimes a little bit slow in being met. Particularly is this true in the United States where machinery methods change so rapidly. But once the changed situation is fully realized, the conditions towards safer operation are speedily recognized and every effort made to make the worker a "safe" worker. Hence it is not surprising to see the rapid decline in the number of accidents in practically every branch of American industry.

Whatever may be the experience of other countries, American experience is that the less government interferes in business the better for both government and business. Laws that attempt to coerce man to do what is right never succeed, for when they become oppressive they are repealed or ignored to such an extent that prosecution is impossible. On the other hand, men will willingly acquiesce in the opinion and practices of the trade associations to which they belong, and will readily accept and follow advice and suggestions from sources they consider competent.

And, regardless of what may be true of other industries, progress has not been noticeably uneven in the rock products industries. The records, for example, cover practically every cement plant in the country and they show that strictly preventable accidents have been eliminated almost to the vanishing point. Unforseeable accidents are studied as fast as they occur and added to the preventable class, where this is possible. Education of workmen, perhaps the most important work of all, proceeds rapidly under expert tuition. Nor are those in charge ever satisfied with their success, now that safety work is on an institutional basis. The pages given to reports of safety meetings and like news in every issue of ROCK PRODUCTS are an evidence of this. It would be hard to show how more could have been accomplished in any way than has been accomplished by education and example.

Legislation is too slow and cumbersome a method to deal with the fast changing conditions of industry. Our law makers are rarely competent to pass upon industrial problems, as experience has shown. The United States is too large and has too diverse conditions of climate, geology, and society for the effective control of industry by the national bureaus that are so efficient in European countries. American industries have had to solve their problems of safety in an American way, and the results, so far as the rock products industries are concerned seem to be all that a fair-minded man could ask for. And the same will eventually prove true in regard to other business practices. Americans will adopt them because of their inherent economic and humanitarian soundness rather than because laws may compel them to.

Voluntary Codes Rather Than Laws

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	1-28-30	94	96	
Alpha P. C. new com.	1-27-30	31½	32	75c qu. Jan. 15
Alpha P. C. pfd.	1-25-30	110	.....	
American Aggregates com.[29]	1-28-30	15	20	75c qu. Mar. 1
Amer. Aggregate 6's, bonds	1-27-30	85	.....	
American Brick Co., sand-lime brick	1-24-30	.....	12½	25c qu. Feb. 1
American Brick Co. pfd., sand-lime brick	12-13-29	.....	80	50c qu. Feb. 1
Am. L. & S. 1st 7's[29]	1-28-30	94	97	
American Silica Corp. 6½'s[49]	1-28-30	No market		
Arundel Corp. new com.	1-27-30	41⅛	42	75c qu. Jan. 1
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[40]	1-28-30	No market		
Atlas P. C. com.	1-27-30	35	35⅜	
Beaver P. C. 1st 7's[29]	1-10-30	.....	100	
Bessemer L. & C. Class A[4]	1-24-30	30½	31½	75c qu. Feb. 1
Bessemer L. & C. 1st 6½'s[4]	1-24-30	85	90	
Bloomington Limestone 6's[29]	1-28-30	75	85	
Boston S. & G. new com.[47]	1-25-30	17	20	40c qu. Jan. 1
Boston S. G. new 7% pfd.[47]	1-25-30	46	50	87½c qu. Jan. 1
Calaveras Cement 7% pfd.	1-23-30	85	87	1.75 qu. Jan. 15
Calaveras Cement com.	1-23-30	10	15	
Canada Cem. com.	1-27-30	16¾	17	
Canada Cement pfd.	1-27-30	93	95	1.62½ qu. Dec. 31
Canada Cem. 5½'s[43]	1-25-30	98¼	99	
Canada Cr. St. Corp. 1st 6½'s[13]	1-25-30	97½	.....	
Can. Gyp. & Alabastine (new)	1-27-30	23¼	23¾	37½c qu. Jan. 2
Certainteed Prod. com.	1-27-30	12¼	12¾	
Certainteed Prod. pfd.	1-27-30	40	58	1.75 qu. Jan. 1
Cleveland Quarries new st'k	1-27-30	69	71	
Columbia S. & G. pfd.	1-27-30	85	90	
Consol. Cement 1st 6½'s, A	1-28-30	75	85	
Consol. Cement 6½% notes[24]	1-28-30	80	85	
Consol. Cement. pfd.[29]	1-28-30	50	60	
Consol. Oka S. & G. 6½'s[12] (Canada)	1-25-30	98	100	
Consol. Rock Prod. com.[14]	1-23-30	2½	3½	
Consol. Rock Prod. pfd.[14]	1-23-30	13½	14	
Consol. S. & G. com. (Can.)	11-18-29	15	.....	
Consol. S. & G. pfd. (Can.)[13]	1-25-30	84½	86	
Construction Mat. com.	1-27-30	14½	15¾	
Construction Mat. pfd.[29]	1-28-30	38½	.....	87½c qu. Feb. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	1-23-30	94	98	
Coosa P. C. 1st 6's[29]	1-28-30	50	53	
Coplay Cem. Mfg. 1st 6's[10]	1-25-30	90	.....	
Coplay Cem. Mfg. com.[10]	1-25-30	10	.....	
Coplay Cem. Mfg. pfd.[10]	1-25-30	70	.....	
Dewey P. C. 6's (1942)	1-28-30	97	.....	
Dewey P. C. 6's (1930)	1-28-30	97	.....	
Dewey P. C. 6's (1931-41)	1-28-30	97	.....	
Dolese & Shepard	1-27-30	75	80	$2 qu. & $1 ex. Jan. 2
Edison P. C. com.[39]	1-25-30	10c	.....	
Edison P. C. pfd.[39]	1-25-30	25c	.....	
Giant P. C. com.[2]	1-25-30	.....	20	
Giant P. C. pfd.[2]	1-25-30	.....	30	
Ideal Cement, new com.	1-27-30	58	63	50c spec., 50c ex. Dec. 21 & 75 qu. Jan. 1
Ideal Cement 5's, 1943[38]	1-13-30	97	99	
Indiana Limestone com.[29]	1-28-30	2	5	
Indiana Limestone pfd.[29]	1-28-30	.....	50	
Indiana Limestone 6's	1-27-30	69¾	70	
International Cem. com.	1-27-30	61	61¼	$1 qu. Dec. 31
International Cem. bonds 5's	1-27-30	94	94⅞	Semi-ann. int.
Iron City S. & G. bonds 6's[46]	1-24-30	80	.....	
Kelley Is. L. & T. new st'k	1-27-30	40	44	62½c qu., 50c ex. Jan. 1
Ky. Cons. St. com. Voting Trust Certif.[48]	1-24-30	12	13	
Ky. Cons. Stone 6½'s[48]	1-24-30	94	98	
Ky. Cons. Stone pfd.[48]	1-24-30	90	95	
Ky. Cons. Stone com.[48]	1-24-30	12	13	
Lawrence P. C.	1-25-30	57	63	
Lawrence P. C. 5½'s, 1942	1- 8-30	84	90	
Lehigh P. C.	1-27-30	35½	36	62½c qu. Feb. 1
Lehigh P. C. pfd.	1-27-30	105	106	1¾% qu. Jan. 2
Louisville Cement[7]	1-24-30	230	.....	
Lyman-Richey 1st 6's, 1932[13]	11-18-29	96	99	
Lyman-Richey 1st 6's, 1935[13]	11-18-29	95	98	
Marblehead Lime 6's[11]	1-24-30	94	98	
Material Service Corp.[29]	1-28-30	21⅜	.....	
Medusa Portland Cem.[29]	1-28-30	105	115	1.50 Jan. 1
Mich. L. & C. com.[6]	1-25-30	30	.....	
Missouri P. C.	1-27-30	33	34	
Monolith Midwest[14]	1-23-30	4	5	
Monolith bonds, 6's[9]	1- 9-30	97½	100	
Monolith P. C. com.	1-23-30	6½	.....	40c s.-a. Jan. 1
Monolith P. C. pfd.[9]	1-15-30	7½	8	40c s.-a. Jan. 1
Monolith P. C. units[9]	1- 9-30	24½	26½	
National Cem. (Can.) 1st 7's[42]	1-25-30	99½	.....	
National Gypsum A com.	1-27-30	8	9	
National Gypsum pfd.	1-27-30	39	44	
Nazareth Cem. com.[26]	1-24-30	19	23	
Nazareth Cem. pfd.[26]	1-24-30	95	.....	
Newaygo P. C. 1st 6½'s[29]	1-28-30	101½	102½	
New Eng. Lime 1st 6's[11]	1-24-30	85	95	
N. Y. Trap Rock 1st 6's	1-25-30	95¼	.....	
North Amer. Cem. 1st 6½'s	1-27-30	55	.....	
North Amer. Cem. com.[29]	1-28-30	2	2½	
North Amer. Cem. 7% pfd.[29]	1-28-30	17	22	
North Amer. Cem. units[29]	1-28-30	20	25	
North Shore Mat. 1st 5's[15]	1-28-30	98½	.....	
Northwestern States P. C.[37]	1-25-30	130	140	$2 Jan. 1
Ohio River Sand com.	1-13-30	.....	27½	
Ohio River Sand 7% pfd.	1-13-30	93	102	
Ohio River S. & G. 6's[16]	1-25-30	90	95	
Pac. Coast Agg. 6½'s[23]	11-14-29	99	.....	
Pac. Coast Agg. 7's[23]	11-14-29	99	.....	
Pacific Coast Cem. 6's[5]	1-23-30	80	85	
Pacific P. C. com.	1-23-30	24	30	
Pacific P. C. pfd.	1-23-30	78	80	1.62½ qu. Jan. 5
Pacific P. C. 6's[5]	1-23-30	99¼	.....	
Peerless Cem. (new) com.[21]	1-25-30	9	11	
Peerless Cem. pfd.[21]	1-25-30	80	90	1.75 Dec. 31
Penn-Dixie Cem. pfd.	1-27-30	40	42¼	
Penn-Dixie Cem.com.	1-27-30	7	7½	
Penn-Dixie Cem. 6's	1-27-30	80½	81	
Penn. Glass Sand Corp. 6's†	1- 8-30	101	102½	
Penn. Glass Sand pfd.	1- 8-30	100	.....	1.75 qu. Jan. 1
Petoskey P. C.	1-27-30	7½	8¾	15c qu. Dec. 31
Port Stockton Cem. com.[9]	1-15-30	.....	4	
Riverside P. C. com.	1-23-30	10	15	
Riverside P. C. pfd.[5]	1-23-30	75	82	
Riverside P. C., A[9]	1-15-30	.....	16½	
Riverside P. C., B[41]	1-23-30	4	6	
Santa Cruz P.C. 1st 6's, 1945‡	1-23-30	105¾	.....	6% annually
Santa Cruz P. C. com.	1-23-30	92	.....	$1 Jan. 1 & $2 ex.
Schumacher Wallboard com.	1-23-30	10	12	
Schumacher Wallboard pfd.	1-23-30	22	24	
Southwestern P. C. units[14]	1-23-30	260	.....	
Standard Paving & Mat. (Can.) com.	1-27-30	25	25½	50c qu. Feb. 15
Standard Pav. & Mat. pfd.	1-27-30	87½	88	
Superior P. C., A	1-23-30	39⅜	41½	27½c mo. Feb. 1
Superior P. C., B	1-23-30	15¼	20	
Trinity P. C. units[37]	1-25-30	126	132	
Trinity P. C. com.[37]	1-25-30	45	.....	
Trinity P. C. pfd.[29]	1-28-30	102	.....	
U. S. Gypsum com.	1-27-30	42	43¼	40c qu. Dec. 31
U. S. Gypsum pfd.[29]	1-28-30	116	126	1¾% qu. Dec. 31
Universal G. & L. com.[3]	1-28-30	1	.....	
Universal G. & L. pfd.[3]	1-28-30	.....	10	
Universal G. & L., V.T.C.[3]	1-28-30	No market		
Universal G. &L. 1st 6's[3]	1-28-30	No market		
Warner Co. com.[16]	1-25-30	36	42	50c qu., 50c ex. Jan. 15
Warner Co. 1st 7% pfd.[16]	1-25-30	98	103	1¾% qu. Jan. 2
Warner Co. 1st 6's[8]	1-28-30	95	97	
Whitehall Cem. Mfg. com.[36]	1-24-30	40	.....	
Whitehall Cem. Mfg. pfd.[36]	1-24-30	48	.....	
Wisconsin L. & C. 1st 6's[35]	1-28-30	99	.....	
Wolverine P. C. com.	1-27-30	5	5½	
Yosemite P. C., A com.[44]	1-23-30	2½	3	

†$52,000 called for redemption at 105, January 1, 1930. ‡Entire issue called for redemption at 110, March 1, 1930.

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler Beadling & Co., Youngstown, Ohio. [5]Freeman, Smith & Camp Co., San Francisco, Calif. [6]Frederic H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Peters Trust Co., Omaha, Neb. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co., of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simons & Co., Inc., Detroit, Mich. [22]Hemphill, Noyes & Co., New York, N. Y. [23]California Co., Los Angeles, Calif. [24]A. B. Leach & Co., Inc., Chicago, Ill. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [28]Bank of Republic, Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago, Ill. [33]Boettcher Newton & Co., Denver, Colo. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick & Co., Montreal, Quebec. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, New York City and Chicago. [42]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co., Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Wise, Hobbs & Arnold, Boston. [48]E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co., Chicago, Ill.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Atlantic Gypsum Products Co. 6's, 1941, $4,000 and 40 shs. com.[1]	35%	.....
Atlantic Gypsum Products 6's, 1941, $5,000; 50 shs. com. as bonus[2]	49%	.....
Atlantic Gypsum Prod. Co. pfd., 750 sh.[10]	$10 per share	.....
Consolidated Cem. com. v.t.c., 3220 shs.[1]	1½ per share	.....
Indiana Limestone deb. 7's, 1936, wtih warrants ($1,000)[4]	$500 for the lot	.....
Penn.-Dixie Cement Corp. 6's, Sept. 15, 1941 ($1,000)[5]	71%	.....
Universal Gypsum com. trust ctfs., 800 shs.[2] (no par)	$5 for the lot	.....
Universal Gypsum com., 300 shs.[2] (no par)	$6 for the lot	.....

[1]Price at auction by Wise, Hobbs & Arnold, Boston, Dec. 18, 1929. [2]Price at auction by R. L. Day & Co., Boston, Dec. 18, 1929. [3]Price at auction by Adrian H. Muller & Son, New York, Dec. 18, 1929. [4]Price at auction by Adrian H. Muller & Son, Dec. 26, 1929. [5]Price at auction by Wise, Hobbs & Arnold, Dec. 26, 1929. [10]Price at auction by R. L. Day & Co., Boston, Nov. 6, 1929.

Riverside Cement Company's Annual Report

JOHN TREANOR, president, reports for the board of directors to the stockholders of the Riverside Cement Co., Los Angeles, Calif., in part as follows: "Consumption of cement in our area of distribution during 1929 has been less than in any year since 1922. The business available for local companies has been further reduced by the competition of foreign cement, which has been imported in large quantities. Selling prices have steadily declined throughout the year. Under the circumstances the earnings of the Riverside Cement Co. have been well maintained; during the last quarter of the year, when prices were especially depressed, net profits, after reserves for depreciation, depletion and federal income tax, amounted to $169,592.05, sufficient to cover the dividend requirements for the period of the outstanding 'A' common stock as well as of the outstanding preferred stock. The prospects for 1930 are encouraging in that the use of cement both in building construction and in paving gives promise of increase. In view also of important reductions in operating cost, the management of the company looks forward to the coming year with confidence."

OPERATING PROFITS

Profits January 1-December 31, before depreciation, depletion and federal income tax	$ 1,519,817.97
Reserves for depreciation and depletion	383,002.52
Net profits before income tax	1,136,815.45
Provision for federal income tax	123,730.48
Net profit for period	1,013,084.97
The net profit was disposed as follows:	
Dividend on first preferred stock	373,358.52
Dividend on "A" stock	300,000.00
Appropriated for retirement of first preferred stock	127,141.48
To surplus	212,584.97
	$1,013,084.97

CONSOLIDATED BALANCE SHEET
(December 31, 1929)
ASSETS

Cash	$ 1,622,701.28
Stocks and bonds	398,301.07
Notes and accounts receivable	597,644.18
Inventories	901,639.46
Total current assets	$ 3,520,285.99
Investments	308,952.35
Deferred charges	41,537.39
Real estate, plant and equipment, less depreciation and depletion	8,774,321.87
Total assets	$12,645,097.60

LIABILITIES

Payrolls, notes and accounts payable	$ 296,355.77
Reserve for federal income tax	158,785.89
Total current liabilities	$ 455,141.66
Other reserves	348,418.08
Capital	9,552,500.00
Surplus	2,289,037.86
Total liabilities	$12,645,097.60

Roquemore Gravel Company Bonds Offered

THE CITIZENS AND SOUTHERN CO., Savannah, Ga., is offering $250,000 in 6½% gold, sinking fund bonds of the Roquemore Gravel Co., Montgomery, Ala. The bonds are dated January 1, 1930, and are due January 1, 1940, interest payable semi-annually, January 1 and July 1, and are offered at par-100 in denominations of $1000. The total authorized is $250,000. The trustee is the Citizens and Southern National Bank, Savannah, Ga.

The bonds are callable as a whole or in part on any interest date on 60 days' notice at 102. The security is a first mortgage on the fixed assets of the company comprising 3103 acres of gravel property near Montgomery, Ala., and three gravel and sand plants. The purpose of the issue is for the acquisition of the properties of the Alabama Sand and Gravel Co. and additional working capital.

The Roquemore Gravel Co. was incorporated in 1920. The directors are J. D. Roquemore, W. A. Bellingrath, R. M. Hobbie, B. P. Crum, J. M. Hobbie, H. M. Hobbie, C. A. Thigpen, W. E. Matthews, Jr.

Capitalization:	Outstanding
Common stock	$250,000
Funded debt	250,000

The total net tangible assets per books as of September 30, 1929, are in excess of 3½ times this issue of bonds, and the book value of the common stock as of this date is $262 per share.

Earnings—Average annual net earnings for the 6¾ years period ended September 30, 1929, amounts to $137,236 before interest and federal taxes, and $113,114 after all charges. This average before interest and taxes is 8.4 times the maximum interest requirements of this issue, and 3.3 times the maximum interest and principal requirements. Shipments for the calendar year 1928 amounted to 1,947,375 tons.

Sinking Fund—The deed of trust requires equal monthly deposits with the trustee of interest and principal next due, beginning January 27, 1931.

National Lime, Cement and By-Products Corp. Preferred Stock Offered

AN ISSUE of $250,000 7% cumulative preferred stock is being offered by the National Lime, Cement and By-Products Corp., Buffalo, N. Y., the proceeds of which are to go towards the building of a new 1000-bbl. lime and hydrate plant in Talbert county, Ala. Soule and Zepp, Inc., Baltimore, Md., are the consulting engineers. Schuyler L. Hoff, 233 Pearl St., Buffalo, is secretary of the National company.

South Dakota State Cement Plant Earnings in 1929

A NET profit of $84,247, after depreciation and interest has been deducted, was made by the South Dakota cement plant at Rapid City, S. D., during 1929, according to an audit of the books. This is an increase of $44,870 over 1928, when the net profit was $39,377. Bond interest in 1929 was $102,700. Total sales in barrels for 1929 was 1,384,509 compared to 1,354,433 in 1928.—*Dubuque* (Iowa) *Tribune.*

Arundel Corporation's Annual Report of Finances

THE Arundel Corp., Baltimore, Md., among the country's largest producers of sand and gravel, reports for the year ending December 31, 1929:

BALANCE SHEET, DECEMBER 31, 1929
ASSETS

Current assets:		
Cash		$ 1,086,045.86
Market securities at cost (market value, $414,000)		415,810.00
Accounts receivable		1,729,121.69
Notes receivable		70,824.37
Accrued interest and other receivables		82,910.81
Materials and supplies		44,045.35
Notes receivable account Everglades Drainage District, subject to renewal		1,890,357.66
		$ 5,319,115.74
Deferred charges to future operations:		
Prepaid insurance		$ 64,955.98
Investments:		
Marketable securities deposited in escrow, at cost (market value, $627,250)		$ 646,590.91
Mortgage receivable, due 1931		45,000.00
Stocks and bonds		275,326.17
		$ 966,917.08
Fixed assets:		
Land, buildings, machinery, floating equipment, etc.		$ 7,692,611.84
Less reserve for depreciation and depletion		3,782,265.91
		$ 3,910,345.93
		$10,261,334.73

LIABILITIES

Current liabilities:		
Notes payable		$ 210,000.00
Dividend payable January 2, 1930		369,391.50
Accounts payable		490,220.38
Accounts payable to affiliated corporations		26,872.72
Accrued expenses		33,917.73
Provision for federal tax on income for the year 1929		202,450.05
		$ 1,332,852.38
Deferred income on contracts		$ 274,506.10
Reserve for insurance		$ 92,510.40
Capital stock:		
Authorized, 500,000 shares of no par value:		
Whereof 495,426 shares issued for		$ 4,954,260.00
Less 2,870.4 shares reacquired and held in treasury		28,704.00
		$ 4,925,556.00
Surplus per accompanying statement		$ 3,635,909.85
Continent liabilities:		
Subscription to barge syndicate		$ 176,433.76
Notes receivable discounted		59,849.90
		$ 236,283.66
		$10,261,334.73

STATEMENT OF SURPLUS FOR THE YEAR 1929

Balance, January 1, 1929	$2,702,133.83
Income from operations for the year 1929, before provision for federal tax on income	2,262,291.49
	4,964,425.32
Deduct:	
Dividends	$1,108,170.00
Additional federal tax on income for prior years	17,895.42
Provision for federal tax on income for the year 1929	202,450.05
	$1,328,515.47
Balance, December 31, 1929, to balance sheet	$3,635,909.85

Recent Dividends Announced

Bessemer L. and C. cl. A qu.	75c	Feb. 1
Consolidated Oka S. & G. pfd. (qu.)	$1.75	Jan. 2
Standard Pav. & Mat. (qu.)	50c	Feb. 15

Sand-Lime Brick Association Program

THE FOLLOWING is the advance program for the 1930 convention of the Sand-Lime Brick Association, to be held in the Hotel Pennsylvania, New York City, February 4, 5 and 6:

CONVENTION PROGRAM

Tuesday, February 4, 10:30 a. m.

Enrollment, payment of dues, introduction of new members.

Afternoon Session, 2 p. m.

President's message.
Report of secretary.
Communications.
Report of treasurer.
Reports of standing committees.
Appointment of committees—Audit, nomination, resolutions.
The Absorption and Strength of Commercial Sand-Lime Brick, J. A. Murray, Bureau of Standards, Washington, D. C.
What Architects Do Not Know About Sand-Lime Brick, Kenneth K. Stowell, associate editor, Architectural Forum, New York City, N. Y.
Handling Bulk Lime by Suction, H. J. Levine, National Brick Corp., Long Island City, N. Y.
New York State Lien Law, W. K. Squier, Paragon Plaster Co., Syracuse, N. Y.
Removing Scale from Car Tops by Sand Blast, W. A. Smyth, York Sandstone Brick Co., Ltd., Toronto, Canada.
The Use of Testing Machines to Control the Quality of Brick, John R. Kauffman, Crume Brick Co., Dayton, Ohio. Followed by demonstration of portable testing machines.

WEDNESDAY, FEBRUARY 5

Morning Session, 10 a. m.

History and Study of Masonry Opening Sizes Committee, P. H. H. Dunn, secretary of committee and representative of Division of Simplified Practice, Bureau of Standards, Washington, D. C.
Gypsum Products, Old and New, J. M. Porter, research engineer, Structural Gypsum Corp., Linden, N. J.
Possibilities of Sand-Lime Brick, G. G. Heghinian, consulting engineer, Baltimore, Md.
Mortars and Masonry, C. E. Ellsworth, chief engineer, construction division, National Lime Association, Washington, D. C.
Improvements in Sand-Lime Brick Machinery, E. D. Church, Jackson and Church Co., Saginaw, Mich.
Brick Engineering, T. C. Tayler, president, Sand-Lime Products Co., Detroit, Mich.
Veneering of Sand-Lime Brick, R. B. Stuckey, W. A. Riddell Co., Bucyrus, Ohio.

Afternoon Session, 2 p. m.

Buffet luncheon, 12:30 p. m.
The Michigan Sand-Lime Brick Association, W. W. Dohany, secretary, Detroit, Mich.
Activities of the Bureau of Standards of Interest to Sand-Lime Brick Producers, J. A. Murray, Bureau of Standards, Washington, D. C.
Activities of Committee C-3 on Brick, A. S. T. M., W. H. Crume, Crume Brick Co., Dayton, Ohio.
City Building Codes, J. Morley Zander, Saginaw Brick Co., Saginaw, Mich.
Gaging the Severity of Building Fires, S. H. Ingberg, Fire Resistance Section, Bureau of Standards, Washington, D. C.
The Rod Mill and Its Function in the Manufacture of Sand-Lime Brick, W. H. Withington, Hardinge Co., Inc., York, Penn.
Report of nominating committee.
Election of officers and executive committee.

THURSDAY, FEBRUARY 6

Morning Session, 9 a. m.

Publicity and Advertising—Recommendations and Means of Handling, John L. Jackson, Saginaw, Mich.
Discussion—Sales and Advertising.
Round Table—
Members only.
(Not reported.)
Bring along your troubles.
Cost of Brick—
Bring figures for year 1929.
Unfinished business.
New business.
Report of audit and resolutions committees.
Introduction of new officers for 1930.

Afternoon Session, 2 p. m.

Visiting plants—National Brick Corp., Long Island City, N. Y.; Paramount Brick Works, Brooklyn, N. Y.

COMMITTEE MEETINGS

Monday, February 3

2 p. m.—Sub-committee on Sand-Lime Brick of A. S. T. M. Committee C-3 on Brick, T. R. Lawson, chairman.
3:30 p. m.—Educational and Standing Committee on Simplified Practice, J. A. Murray, chairman.

Tuesday, February 4

10 a. m.—Executive Committee, C. H. Carmichael, chairman.
10 a. m.—Traffic Committee, J. M. Zander, chairman.
11 a. m.—Combined Meeting of Advertising and Publicity Committees.

California Group to Operate Lime and "Dry Ice" Plants

CALIFORNIA Lime Products Co., a $2,000,000 corporation, has been organized by a group of Sacramento, Calif., business men for the purpose of manufacturing and marketing various lime products.

The company, headed by Charles Lumbard, proposes to construct a lime burning and dry-ice plant at Walerga station near Sacramento. It has obtained an option on a large limestone deposit near Towie, Placer county, according to reports.

The company's capital structure is represented by 200,000 shares capital stock of $10 parity. Under permit of the California state corporation department, the company is authorized to sell $1,500,000 of this stock, of which amount $750,000 is to be sold to the public.—*San Francisco* (Calif.) *Examiner.*

Slate Association Convenes at New York

THE National Slate Association held a most successful annual meeting at the Hotel Commodore, New York City, on January 20, 21 and 22, with a total attendance of about 200 including slate producers, marketing companies, distributors, roofing and setting contractors, slate salesmen and the Hosts Club.

The producers held several important sessions at which increased support of the association was urged and favorable action taken. Several important new activities to be undertaken by the association for the benefit of the members were discussed and plans are under way.

A special session of the setting contractors was held for simplifications of sizes of fireplace openings with other groups furnishing materials used on the construction of fireplaces. Representatives of Alberene Stone Co., Associated Tile Manufacturers and the U. S. Dept. of Commerce Division of Simplified Practice and others were present.

The roofing contractors had their usual intensive sessions during the three days, intimate group meeting for discussion of their various problems, technical, trade practices and trade relations, short cuts on estimating and general session with the producers for reporting recommendations of their various group meetings.

The Wednesday morning session of Committee D-16 on Slate of the American Society for Testing Materials with the entire industry—slate producers, roofing and setting contractors and the Hosts Club, the concerns furnishings the slate industry equipment, supplies and service—was very constructive and several valuable papers were read. A report on weathering characteristics of slate by D. W. Kessler of the Bureau of Standards, Washington, D. C., was a feature. Frank H. Rudy of the Monson Maine Slate Co., Boston, Mass., spoke on "Comparative Tests of Slate and Manufactured Insulating Materials"; Robert Sibley of the Disston Sons Co., Philadelphia, Penn., gave an illustrated talk on the new "Carboloy " tipped tooth saw which is now in operation in several slate quarries with unusually satisfactory results and H. MacMillan, Hazard Wire Rope Co., Wilkes-Barre, Penn., discussed the question of proposed research by his company.

The annual dinner on the evening of January 21 and the Hosts Club luncheon on the following day with Count Ernesto Russo as the speaker were most successful events.

A more complete report on the sessions will appear in a forthcoming issue of Rock Products.

Missouri Portland to Improve Memphis Gravel Plant

THE sand and gravel plant of the Missouri Portland Cement Co. at Memphis, Tenn., is being overhauled and some important changes being made. A Busch-Sulzer Bros. Diesel engine rated at 425 hp., 257 r.p.m. is being installed and direct connected through a Westinghouse k.v.a. generator to a 15 in. Morris sand pump; this engine replaces electric drive. The suction line is being provided with an 8 nozzle jet head for 100 lb. pressure. A 60 in. by 16 ft. Link-Belt Co. scrubber screen is being installed on the dredge, and many other improvements are to be made. It is expected the daily capacity will be increased to 1800 tons. The changes are being made under the supervision of E. M. Stevens, chief engineer and J. W. Wilkinson, superintendent of the plant.

Kenosha Gravel Trades Pit

KENOSHA Sand and Gravel Co., Kenosha, Wis., has transferred a nine-acre gravel pit to the Kenosha County Highway Commission in return for a 4½-acre tract owned by the county. Both gravel pits are located along Silverlake. By acquiring the smaller tract formerly owned by the county, the Kenosha company gained access to a 40-acre pit which it has to the rear of this. *Kenosha* (Wis.) *News.*

Beg Your Pardon!

OUR attention is called to the fact that the new plant recently completed at Lexington, Ky., is owned by the Central Rock Co. of Lexington and not by the Kentucky Consolidated Stone Co. as reported in Rock Products, January 4, p. 97.

Portland Cement in December—Summary of Estimates by Months and Districts, 1929

Preliminary Estimates Indicate Production of 170,198,000 Barrels and Shipments of 169,394,000 Barrels in 1929

THE PORTLAND cement industry in December, 1929, produced 11,215,000 bbl., shipped 5,908,000 bbl. from the mills, and had in stock at the end of the month 23,519,000 bbl., according to the United States Bureau of Mines, Department of Commerce. The production of portland cement in December, 1929, showed a decrease of 8% and shipments a decrease of 20%, as compared with December, 1928. Portland cement stocks at the mills were 2.6% higher than a year ago.

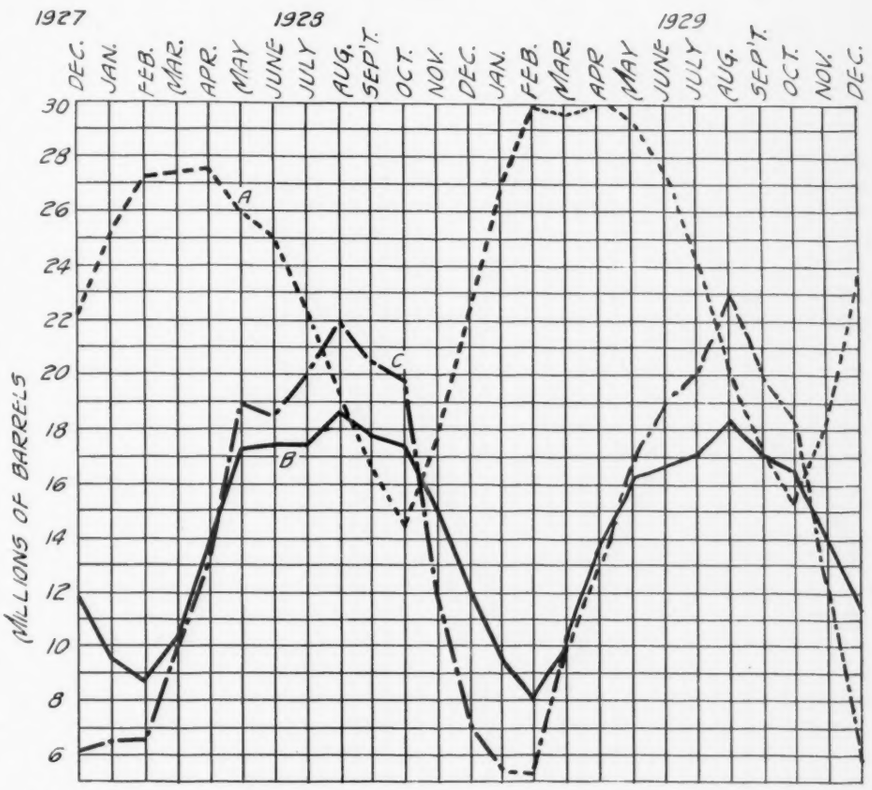
The preliminary totals for 1929 show decreases of 3.5% in production and 3.7% in shipments from the final totals for 1928.

The statistics here presented are compiled from reports for December from all manufacturing plants except two for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 165 plants at the close of December, 1929, and of 159 plants at the close of December, 1928.

RELATION OF PRODUCTION TO CAPACITY

	Dec. 1928	Dec. 1929	Nov. 1929	Oct. 1929	Sept. 1929
	Pct.	Pct.	Pct.	Pct.	Pct.
The month	60.4	51.5	66.6	77.0	81.8
12 months ended	74.0	66.4	66.8	67.3	67.5



(A) Stocks of finished portland cement at factories; (B) Production of finished portland cement; (C) Shipments of finished portland cement from factories

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN OCTOBER AND NOVEMBER, 1928 AND 1929, IN BARRELS*

Shipped to—	1928—Oct.—	1929	1928—Nov.—	1929
Alabama	226,835	172,980	192,012	132,035
Alaska	132	662	264	396
Arizona	60,063	52,544	56,742	43,145
Arkansas	126,798	190,656	99,304	133,371
California	1,145,337	1,075,308	1,025,113	943,641
Colorado	114,600	97,352	52,084	32,910
Connecticut	259,374	229,221	161,388	178,005
Delaware	73,582	36,005	25,357	28,275
District of Columbia	133,450	104,051	88,507	99,047
Florida	142,911	106,271	117,845	111,127
Georgia	180,537	124,215	146,394	121,871
Hawaii	34,436	22,716	22,593	26,788
Idaho	28,253	28,709	17,765	17,468
Illinois	2,127,381	1,406,895	930,003	782,779
Indiana	658,331	686,986	258,523	326,534
Iowa	442,740	716,047	96,294	127,446
Kansas	316,943	336,060	167,928	159,803
Kentucky	203,725	178,287	146,416	107,310
Louisiana	106,819	245,643	104,808	152,054
Maine	72,694	80,564	30,175	52,865
Maryland	307,849	291,625	157,297	233,983
Massachusetts	337,880	365,195	224,846	225,482
Michigan	1,449,956	1,161,054	728,972	588,511
Minnesota	306,698	352,958	124,063	130,411
Mississippi	133,253	99,934	124,113	71,069
Missouri	583,508	681,598	364,782	396,019
Montana	52,977	55,468	25,857	16,035
Nebraska	174,041	213,158	67,962	61,548
Nevada	9,954	15,028	9,566	8,173
New Hampshire	73,003	67,001	37,083	37,526
New Jersey	1,064,536	911,203	690,435	678,291
New Mexico	37,837	28,479	21,301	15,557
New York	2,445,879	2,295,014	1,565,942	1,441,207
North Carolina	238,528	147,399	248,290	110,928
North Dakota	41,390	42,474	14,375	9,564
Ohio	1,312,086	1,218,439	707,863	638,120
Oklahoma	314,273	376,193	238,178	261,283
Oregon	120,863	114,228	65,960	78,363
Pennsylvania	1,651,472	1,550,799	958,080	1,022,410
Porto Rico	0	5,195	500	3,520
Rhode Island	87,953	78,405	61,403	58,690
South Carolina	154,004	88,492	135,037	70,756
South Dakota	52,621	94,859	17,271	22,438
Tennessee	344,413	358,340	257,552	228,476
Texas	564,578	759,309	447,090	475,332
Utah	51,793	60,619	29,404	37,616
Vermont	107,388	109,422	31,272	43,012
Virginia	220,617	152,804	148,508	120,589
Washington	261,412	240,543	243,351	158,675
West Virginia	170,134	168,957	94,931	103,156
Wisconsin	622,618	597,697	258,637	224,480
Wyoming	17,682	28,708	11,987	9,346
Unspecified	11,413	0	32,678	0
	19,777,550	18,621,769	11,884,101	11,157,436
Foreign countries	58,450	73,231	66,899	64,564
Total shipped from cement plants	19,836,000	18,695,000	11,951,000	11,222,000

*Includes estimated distribution of shipments from three plants each month.

PRODUCTION AND STOCKS OF CLINKER, BY MONTHS, IN 1928 AND 1929, IN BARRELS

Month	1928—Production—	1929	Stock at end of month 1928	1929
January	11,839,000	*12,012,000	9,672,000	9,642,000
February	11,363,000	11,255,000	12,237,000	12,436,000
March	12,501,000	12,450,000	14,463,000	14,948,000
April	13,844,000	14,166,000	15,002,000	*15,479,000
May	16,025,000	*15,444,000	14,329,000	14,911,000
June	15,940,000	15,312,000	12,944,000	*13,587,000
July	15,981,000	*15,214,000	11,707,000	11,619,000
August	16,202,000	*15,829,000	9,357,000	*8,995,000
September	15,909,000	*15,165,000	7,566,000	*7,009,000
October	15,782,000	*15,515,000	5,944,000	*5,934,000
November	14,930,000	*14,087,000	5,953,000	*6,134,000
December	13,426,000	12,539,000	7,422,000	7,604,000

*Revised.

†The inclusion of Wyoming begins with April, 1929; of Idaho, with June, 1929; of Arkansas, with September, 1929.

Exports and Imports

(Compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision)

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN NOVEMBER, 1929

Exported to—	Barrels	Value
Canada	2,868	$ 15,769
Central America	3,852	10,446
Cuba	6,304	17,111
Other West Indies and Bermuda	3,887	8,629
Mexico	17,488	55,942
South America	12,692	53,029
Other countries	6,287	37,271
	53,378	$198,197

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN NOVEMBER, 1929

Imported from	District into which imported	Barrels	Value
Belgium	Los Angeles	47,900	$26,800
	New Orleans	1,463	1,811
	Oregon	3,000	3,741
	Porto Rico	500	636
	Total	52,863	$32,988
Canada	Maine and N. H.	1,383	$3,153
Denmark	Porto Rico	20,175	$27,192
France	New York	496	$1,183
	San Francisco	125	207
	Total	621	$1,390
Germany	Los Angeles	1,350	$2,574
United K'gd'm.	New York	16,061	$23,645
	Philadelphia	4,115	4,902
	Total	20,176	$28,547
	Grand total	96,568	$95,844

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO, IN NOVEMBER, 1929

	Barrels	Value
Alaska	1,076	$ 3,463
Hawaii	29,206	71,274
Porto Rico	5,033	10,235
	35,315	$84,972

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN DECEMBER, 1928 AND 1929, AND STOCKS IN NOVEMBER, 1929, IN BARRELS

District	Production 1928—Dec.—	Production 1929	Shipments 1928—Dec.—	Shipments 1929	Stocks at end of month 1928	Stocks at end of month 1929	Stocks at end of Nov. 1929*
Eastern Penn., N. J. & Md.	2,760,000	2,479,000	1,963,000	1,323,000	5,410,000	5,176,000	4,020,000
New York and Maine	812,000	731,000	495,000	294,000	1,656,000	1,544,000	1,107,000
Ohio, Western Penn., W. Va.	1,029,000	940,000	606,000	511,000	2,861,000	3,010,000	2,580,000
Michigan	1,058,000	1,008,000	416,000	246,000	2,011,000	2,398,000	1,636,000
Wis., Ill., Ind. and Ky.	1,683,000	1,445,000	644,000	429,000	2,736,000	2,885,000	1,869,000
Va., Tenn., Ala., Ga., Fla., La.	1,084,000	905,000	870,000	821,000	1,859,000	1,641,000	1,557,000
Eastern Mo., Ia., Minn., S. D.	1,269,000	993,000	359,000	273,000	2,880,000	2,595,000	1,876,000
Western Mo., Neb., Kans., Okla. and Ark.†	691,000	976,000	507,000	529,000	1,346,000	1,456,000	1,009,000
Texas	472,000	593,000	375,000	450,000	522,000	813,000	670,000
Colo., Mont., Utah, Wyo.† and Idaho†	206,000	84,000	68,000	81,000	524,000	456,000	453,000
California	909,000	913,000	914,000	813,000	696,000	1,090,000	991,000
Oregon and Washington	216,000	148,000	167,000	138,000	417,000	455,000	445,000
	12,189,000	11,215,000	7,384,000	5,908,000	22,918,000	23,519,000	18,213,000

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1928 AND 1929, IN BARRELS

Month	1928—Production—	1929	1928—Shipments—	1929	Stocks at end of month 1928	Stocks at end of month 1929
January	9,768,000	9,881,000	6,541,000	5,707,000	25,116,000	26,797,000
February	8,797,000	8,522,000	6,563,000	5,448,000	27,349,000	29,870,000
March	10,223,000	9,969,000	10,135,000	10,113,000	27,445,000	29,724,000
April	13,468,000	13,750,000	13,307,000	13,325,000	27,627,000	30,151,000
May	17,308,000	16,151,000	18,986,000	16,706,000	25,984,000	29,624,000
June	17,497,000	16,803,000	18,421,000	18,949,000	25,029,000	*27,505,000
July	17,474,000	*17,315,000	19,901,000	*20,319,000	22,580,000	24,525,000
August	18,759,000	18,585,000	21,970,000	23,052,000	19,374,000	20,056,000
September	17,884,000	17,223,000	20,460,000	19,950,000	16,799,000	17,325,000
October	17,533,000	16,731,000	19,836,000	18,695,000	14,579,000	15,381,000
November	15,068,000	*14,053,000	11,951,000	*11,222,000	17,769,000	*18,213,000
December	12,189,000	11,215,000	7,384,000	5,908,000	22,918,000	23,519,000
	175,968,000	170,198,000	175,455,000	169,394,000	.....	.....

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN DECEMBER, 1928 AND 1929, IN BARRELS

District	Production 1928	Production 1929	Stocks at end of month 1928	Stocks at end of month 1929
Eastern Pennsylvania, New Jersey and Maryland	2,893,000	2,527,000	911,000	1,017,000
New York and Maine	976,000	895,000	898,000	714,000
Ohio, Western Pennsylvania and West Virginia	1,352,000	1,295,000	896,000	898,000
Michigan	1,242,000	1,129,000	659,000	629,000
Wisconsin, Illinois, Indiana and Kentucky	1,815,000	1,659,000	429,000	652,000
Virginia, Tennessee, Alabama, Georgia, Florida, Louisiana	1,150,000	986,000	789,000	684,000
Eastern Missouri, Iowa, Minnesota and South Dakota	1,352,000	1,076,000	475,000	529,000
West'n Missouri, Nebraska, Kansas, Oklahoma, Arkansas†	747,000	967,000	396,000	182,000
Texas	483,000	686,000	148,000	474,000
Colorado, Montana, Utah, Wyoming† and Idaho†	229,000	56,000	345,000	243,000
California	960,000	1,070,000	1,198,000	1,105,000
Oregon and Washington	227,000	193,000	278,000	477,000
	13,426,000	12,539,000	7,422,000	7,604,000

*Revised. †Inclusion of Wyoming begins April, 1929; Idaho, June, 1928; Arkansas, September, 1929.

SUMMARY OF MONTHLY ESTIMATES OF PRODUCTION AND SHIPMENTS OF FINISHED PORTLAND CEMENT IN 1929, BY DISTRICTS

(In thousands of barrels)

(Revised January 14, 1930)

District	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1929	1928
Production														
Eastern Pennsylvania, New Jersey, Maryland	2,410	2,199	2,513	3,005	3,541	3,697	3,709	3,941	3,600	3,571	2,973	2,479	37,638	39,677
New York and Maine	405	412	593	900	1,137	1,197	1,366	1,449	1,241	1,129	848	731	11,408	11,484
Ohio, Western Pennsylvania, West Virginia	818	829	908	1,401	1,595	1,885	2,139	2,180	1,919	1,731	1,537	940	17,882	18,326
Michigan	703	525	476	964	1,387	1,466	1,432	1,582	1,519	1,437	1,228	1,008	13,727	13,848
Wisconsin, Illinois, Indiana and Kentucky	1,047	862	1,086	1,903	2,065	2,305	2,354	2,425	2,182	1,935	1,760	1,445	21,369	22,749
Virginia, Tenn., Alabama, Georgia, Fla., La.	884	887	1,028	1,117	1,276	1,279	1,250	1,450	1,298	1,306	1,085	905	13,765	15,949
East'n Missouri, Iowa, Minnesota, So. Dak.	1,198	678	644	1,150	1,548	1,607	1,570	1,578	1,670	1,718	1,344	993	15,698	16,693
West'n Missouri, Neb., Kan., Okla., Ark.*	614	482	620	953	1,117	1,089	1,159	1,430	1,422	1,331	1,176	976	12,369	10,939
Texas	466	399	527	622	655	554	701	707	707	777	661	593	7,369	6,346
Colo., Mont., Utah, Wyoming* and Idaho*	50	74	57	307	363	325	322	357	314	323	120	84	2,696	2,772
California	1,034	1,071	1,170	1,085	1,142	1,110	991	1,128	967	1,179	1,091	913	12,881	13,556
Oregon and Washington	252	104	347	343	325	289	322	358	384	294	230	148	3,396	3,960
	9,881	8,522	9,969	13,750	16,151	16,803	17,315	18,585	17,223	16,731	14,053	11,215	170,198	176,299
Shipments														
Eastern Pennsylvania, New Jersey, Maryland	1,387	1,354	2,506	3,164	3,967	4,201	4,171	4,584	3,924	4,043	2,949	1,323	37,573	39,739
New York and Maine	257	232	504	732	1,184	1,383	1,609	1,747	1,434	1,407	738	294	11,521	11,357
Ohio, Western Pennsylvania, West Virginia	430	442	869	1,274	1,660	2,046	2,282	2,464	2,386	2,176	1,197	511	17,737	18,037
Michigan	266	302	543	897	1,322	1,720	1,950	2,290	1,800	1,323	667	246	13,326	14,044
Wisconsin, Illinois, Indiana and Kentucky	313	373	948	1,608	2,356	2,706	2,837	3,275	2,759	2,346	1,219	429	21,169	22,627
Virginia, Tenn., Alabama, Georgia, Fla., La.	824	662	960	1,251	1,301	1,285	1,543	1,644	1,311	1,419	1,025	821	14,046	15,770
East'n Missouri, Iowa, Minnesota, So. Dak.	189	215	700	1,086	1,649	2,123	2,223	2,589	2,325	1,870	742	273	15,984	16,544
West'n Missouri, Neb., Kan., Okla., Ark.*	349	311	905	1,034	1,007	1,126	1,382	1,773	1,542	1,508	788	529	12,254	11,222
Texas	458	416	594	625	563	579	666	786	681	743	523	450	7,084	6,231
Colo., Mont., Utah, Wyoming* and Idaho*	61	57	144	266	334	336	299	368	358	346	119	81	2,769	2,628
California	1,033	984	1,148	1,058	1,066	1,113	995	1,123	1,023	1,183	1,038	813	12,577	13,700
Oregon and Washington	140	100	292	330	297	331	362	409	407	331	217	138	3,354	3,939
	5,707	5,448	10,113	13,325	16,706	18,949	20,319	23,052	19,950	18,695	11,222	5,908	169,394	175,838

*The inclusion of Wyoming begins with April, 1929; of Idaho, with June, 1929; of Arkansas, with September, 1929.

SUMMARY OF ESTIMATES OF STOCKS OF FINISHED PORTLAND CEMENT AT END OF EACH MONTH IN 1929, BY DISTRICTS

(In thousands of barrels)

(Revised January 14, 1930)

District	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Eastern Pennsylvania, New Jersey and Maryland	6,087	6,933	6,941	6,781	6,355	5,852	5,389	4,777	4,452	4,000	4,020	5,176
New York and Maine	1,804	1,984	2,073	2,242	2,195	2,009	1,765	1,467	1,274	996	1,107	1,544
Ohio, Western Pennsylvania and West Virginia	3,224	3,611	3,650	3,777	3,711	3,578	3,435	3,152	2,685	2,240	2,580	3,010
Michigan	2,435	2,658	2,591	2,659	2,724	2,469	1,979	1,238	961	1,075	1,636	2,398
Wisconsin, Illinois, Indiana and Kentucky	3,423	3,911	4,049	4,343	4,052	3,650	3,168	2,318	1,740	1,329	1,869	2,885
Virginia, Tennessee, Alabama, Georgia, Florida, Louisiana	1,955	2,180	2,248	2,114	2,117	2,111	1,818	1,623	1,610	1,498	1,557	1,641
Eastern Missouri, Iowa, Minnesota and South Dakota	3,891	4,353	4,297	4,362	4,261	3,745	3,092	2,081	1,426	1,273	1,876	2,595
Western Missouri, Nebraska, Kansas, Oklahoma, Arkansas*	1,610	1,782	1,497	1,416	1,527	1,492	1,269	926	798	621	1,009	1,456
Texas	530	513	446	443	535	510	546	466	492	527	670	813
Colorado, Montana, Utah, Wyoming* and Idaho*	524	541	451	492	521	506	529	518	475	451	453	456
California	785	871	894	921	997	995	991	997	941	937	991	1,090
Oregon and Washington	529	533	587	601	629	588	544	493	471	434	445	455
	26,797	29,870	29,724	30,151	29,624	27,505	24,525	20,056	17,325	15,381	18,213	23,519

*The inclusion of Wyoming begins with April, 1929; of Idaho, with June, 1929; of Arkansas, with September, 1929.

SUMMARY OF MONTHLY ESTIMATES OF CLINKER (UNGROUND PORTLAND CEMENT) PRODUCED AND IN STOCK AT MILLS IN THE UNITED STATES IN 1929, BY DISTRICTS

(In thousands of barrels)
(Revised January 14, 1930)

District	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Production													
Eastern Pennsylvania, New Jersey and Maryland	2,824	2,899	2,958	3,100	3,463	3,397	3,314	3,544	3,250	3,202	2,821	2,527	37,299
New York and Maine	585	479	778	953	1,089	1,045	1,108	1,114	1,023	1,045	935	895	11,049
Ohio, Western Pennsylvania and West Virginia	1,121	1,102	1,213	1,394	1,591	1,683	1,772	1,742	1,624	1,578	1,577	1,295	17,692
Michigan	913	733	740	1,122	1,229	1,242	1,287	1,339	1,239	1,350	1,255	1,129	13,578
Wisconsin, Illinois, Indiana and Kentucky	1,617	1,630	1,793	1,890	1,946	2,023	1,851	1,788	1,731	1,779	1,840	1,659	21,547
Virginia, Tenn., Alabama, Georgia, Florida, Louisiana	1,076	1,177	1,146	1,045	1,143	1,195	1,118	1,240	1,157	1,205	1,066	986	13,554
Eastern Missouri, Iowa, Minnesota, South Dakota	1,276	923	926	1,234	1,491	1,457	1,411	1,384	1,551	1,657	1,260	1,076	15,646
West'n Missouri, Nebraska, Kansas, Okla., Arkansas*	715	648	724	929	1,094	1,036	1,072	1,216	1,276	1,281	1,147	967	12,105
Texas	456	430	554	613	617	587	652	770	712	793	731	686	7,601
Colorado, Montana, Utah, Wyoming* and Idaho*	101	84	188	343	323	319	252	263	263	283	116	56	2,591
California	1,053	930	1,079	1,119	1,067	1,052	1,122	1,121	1,020	1,059	1,088	1,070	12,780
Oregon and Washington	275	220	351	424	391	276	255	308	319	283	251	193	3,546
	12,012	11,255	12,450	14,166	15,444	15,312	15,214	15,829	15,165	15,515	14,087	12,539	168,988
Stocks (end of month)													
Eastern Pennsylvania, New Jersey and Maryland	1,344	2,063	2,526	2,648	2,616	2,361	2,003	1,653	1,297	962	891	1,017	.....
New York and Maine	1,080	1,153	1,347	1,413	1,382	1,249	1,014	704	507	441	540	714	.....
Ohio, Western Pennsylvania and West Virginia	1,189	1,469	1,781	1,790	1,804	1,636	1,293	878	607	478	537	898	.....
Michigan	876	1,089	1,354	1,521	1,376	1,167	1,034	804	538	465	502	629	.....
Wisconsin, Illinois, Indiana and Kentucky	1,002	1,769	2,477	2,470	2,356	2,084	1,591	967	512	367	442	652	.....
Virginia, Tenn., Alabama, Georgia, Florida, Louisiana	995	1,292	1,418	1,358	1,232	1,152	1,021	816	686	603	593	684	.....
Eastern Missouri, Iowa, Minnesota, South Dakota	566	817	1,102	1,199	1,157	1,024	869	667	562	499	430	529	.....
West'n Missouri, Nebraska, Kansas, Okla., Arkansas*	530	696	796	774	751	705	624	414	250	208	184	182	.....
Texas	145	182	216	216	187	228	188	255	268	293	372	474	.....
Colorado, Montana, Utah, Wyoming* and Idaho*	395	405	536	573	533	528	459	365	314	274	270	243	.....
California	1,219	1,082	967	1 004	933	878	1,010	1,005	1,060	944	945	1,105	.....
Oregon and Washington	301	419	428	513	584	575	513	467	408	400	428	477	.....
	9,642	12,436	14,948	15,479	14,911	13,587	11,619	8,995	7,009	5,934	6,134	7,604	.....

*The inclusion of Wyoming begins with April, 1929; of Idaho, with June, 1929; of Arkansas, with September, 1929.

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1928 AND 1929

Month	1928—Exports		1929—Exports		1928—Imports		1929—Imports	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	56,400	$204,875	78,639	$283,002	236,771	$315,797	151,302	$177,976
February	62,828	221,620	58,886	225,590	164,408	217,525	118,930	123,123
March	74,983	265,719	69,079	235,164	235,930	330,074	131,909	112,788
April	61,676	205,882	64,145	218,316	249,458	324,371	89,668	114,281
May	70,173	236,005	57,955	219,366	190,509	256,872	200,646	267,854
June	59,536	201,313	96,055	287,612	266,537	359,637	203,545	228,170
July	83,759	291,055	71,992	247,177	112,887	151,877	182,098	199,960
August	88,736	302,866	60,013	225,762	259,975	358,471	183,938	199,403
September	71,995	252,843	86,268	308,631	173,439	226,295	112,372	152,239
October	62,137	246,010	101,359	337,839	152,210	226,909	172,566	187,504
November	69,313	260,310	53,378	198,197	65,969	89,732	96,568	95,844
December	63,120	250,204	.....	.....	175,992	233,300	.....	.....
	824,656	$2,938,702	.....	.....	2,284,085	$3,090,860	.....	.....

Wisconsin Buys Cement Needs Direct from Mills

AFTER a number of conferences and discussion the Wisconsin highway commission has purchased the cement for the 1930 highway work direct from the producers instead of the dealers. The highway commission took the position that all the states adjoining Wisconsin purchased their cement direct and that the prices quoted were lower than any prices ever received by the state.

Contracts were awarded to the Manitowoc Portland Cement Co. for 395,000 bbl. and to the Universal-Atlas Cement Co. for 400,000 bbl. This purchase is part of 1,500,435 bbl. which will be bought by the state during the year.—*Manitowoc* (Wis.) *News.*

Columbia Company Leases Carolina Marble Quarries

A FIFTY-YEAR lease on marble quarries in Cherokee county, North Carolina, has been taken by the Columbia Marble Co. of Knoxville, Tenn. W. S. Burton, secretary and general manager, stated recently. The full lease, he said, was obtained at a consideration of about $1,000,000.

The marble ranges from a cloudy white through blue grays to near blue-black. It is being finished by the Columbia company under the trade names Columbia gray, Creoline Regal blue and Royal blue. Columbia is the only company producing the darker blues, according to Mr. Burton. The standard Tennessee marbles will still be offered.

The marble is being shipped to the Knoxville, Tenn., plant for finishing. At present an expansion program entailing expenditures of $40,000 for new mill equipment is under way.—*Knoxville* (Tenn.) *News.*

Volunteer Portland to Beautify Plant Grounds

PLANS have been adopted by the Volunteer Portland Cement Co., Knoxville, Tenn., for landscaping and beautifying its front grounds near Rutledge pike, C. F. Lewis, plant manager, said recently. More than 100 ornamental trees already have been ordered and the ornamentation will go forward as the seasons dictate.

The Volunteer plant has increased production from 2100 to 3000 bbl. of cement a day over the last 16 months, according to Mr. Lewis—*Knoxville* (Tenn.) *News.*

Wyoming Potash Deposits

FEDERAL agencies are working on the problem of extracting potash salts from the rich lavas that form the Leucite hills of Wyoming, according to John G. Marzel, Wyoming state geologist. The program of research has been extended to the point where possible exploration of other fertilizer salts is being considered. There are in Wyoming, Mr. Marzel says, large deposits of raw rock of high phosphatic values. In addition, there is a good market, the beet industry of the entire Rocky Mountain area.

Converting Ore-Carrier to Self-Unloading Gravel Boat

WORK on the reconstruction of the ore carrier *F. C. Ball* to a self-unloading sand and stone boat will be started in the yards of the American Ship Building Co., Lorain, Ohio. The preliminary work will include the tearing out of the old hatches and holds formerly used for carrying ore.

Upon its completion prior to the opening of 1930 navigation, the *F. C. Ball* will be one of the largest self-unloading sand and stone boats on the Great Lakes, it was stated. The name of the company to operate the converted boat was not disclosed.—*Lorain* (Ohio) *Herald.*

Granite Properties Sold

PURCHASE by Joseph Snyder, New York financier, of the stock of the Canales-Grogan Granite Co. near Elberton, Ga., at a price of approximately $75,000 is reported in the *Cordele* (Ga.) *Dispatch.*

Recent Contract Prices

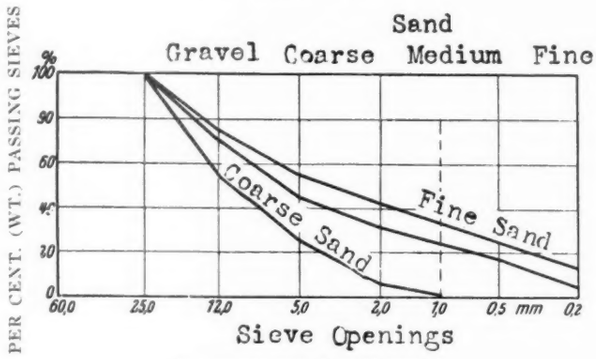
Lowndes County, Miss. Gravel for use on all roads in the county will be purchased from the Kolola Gravel Co., New Hope Gravel Co., Columbus Gravel Co., Southern Sand and Gravel Co. and Water and McCrary. The blanket contract calls for an expenditure of 55 cents per cu. yd. for washed gravel and 40 cents per cu. yd. for sand gravel.

Holly Springs, Miss. Contract awarded Amory Sand and Gravel Co. for gravel at $1.55 f.o.b. plant.

Foreign Abstracts and Patent Review

Concrete Control and Aggregate Testing. A special issue of *Beton and Eisen* features the subject of building control. The various subjects treated by specialists include: "The Simplification of Building Control by Use of Improved Aggregates," by K. Schaechterle (see also *Beton and Eisen*, 1929, No. 17); "The Correction of Fillers for Concrete," by Dr. Nitzsche; "News of Austrian Building Control," by A. Kleinlogel, and "Material Tests for Building Control in Concreting Work," by E. Rissel.

The article by Kleinlogel is of special interest to producers of aggregates. The Austrian specifications require nine circular sieves with respective round openings of 0.2, 0.5, 2, 5, 8, 12, 18, 25 and 60 mm. diameter, suitably assembled into a sieving set and designed for use with 5 kg. of aggregate. The residues of the individual sieves are weighed (according to Fuller), the percent. relation to the entire quantity is figured, the individual percentages are added, a so-called summary curve is formed and entered in a diagram. Upon the basis of many tests, Engineer Otto Korn has determined two boundary lines (see accompanying diagram) and he considers a sand to be good when the summary curve is located between these two boundary curves. If the sand approaches in its composition the lower boundary curve (coarse sand curve) the concrete must be tamped considerably to obtain the minimum of voids since the voids cannot be filled offhand due to leanness of sand in the aggregate. If the sand curve approaches the upper boundary line (fine sand curve) more cement is required in order to obtain sufficient concrete strength.



Aggregate grading diagram

Korn has also developed a new simplified method for determining the content of loamy or clayey substances in aggregates. This method is based upon the transparency of the water to which the sand or other aggregate has been added, in order to determine from the degree of transparency or non-transparency the degree of impurity. In this method there is placed 200 grams of sand in a 9 liter glass vessel of 17 cm. diameter in which there is a water column of exactly 20 cm. depth. The stirred mixture is allowed to settle for 15 minutes, after which the degree of transparency is determined on a white-lacquered sheet metal disc, upon which there is a black circle of 3 cm. diameter. This disc is fastened to a metal rod which is provided with a centimeter scale. That depth of immersion at which the black circle becomes invisible to the eye, the so-called disappearing depth, is considered as the measure of transparency. By means of a number of tests in sands of various degrees of impurity an empirical curve has been plotted from which the relation between disappearing depth and the percentage content of clayey impurities of the aggregate may be obtained.—*Beton and Eisen* (1929), **28**, 20.

Effect of Zinc Oxide on Cement Mortar. Pujol and Rengade presented data concerning the influence of zinc and zinc oxide on the period of set and the tensile strengths of basic slag and other cements at the recent meeting of the French Association of Testing Materials.

During a series of tests on cement specimens conducted at the Ebange blast furnace cement plant, Pujol observed the following irregularities, with no change whatever in the method of testing operations: The mortar specimens stored in damp air did not harden in 24 hours, making their removal sometimes impossible; the 1:3 mortar specimens to be immersed 24 hours crumbled at the end of several hours of immersion, changing into a paste; the 1:3 beaten mortar specimens did not disintegrate, but showed a very pronounced swelling with cracks. In the two cases where the specimens were kept intact, the strengths had decreased considerably at 2 and 7 days' storage. The plastic mortar or beaten mortar specimens kept for 48 hours in the air before immersion, did not disintegrate, but their strengths at 7 days were low and those at 28 days normal. The neat cement specimens appeared normal and their behavior to water good. The iron portland cement showed normal set but decreased strengths.

The cements under consideration were perfectly stable and their chemical composition, including their SO_3 content, quite normal. There had been no complaints from the cement users. There had been no change in the operating methods; but when alterations were made in the laboratory, the old tables covered with sheet iron were replaced with new tables covered with sheet zinc. The abnormal behavior could be attributed only to this change.

The action of lime on zinc is known and also it is recognized that zinc sheets are destroyed rapidly when placed directly in contact with the mortars. In order to prove the supposition, the same cement was mixed in one series with iron and in another with zinc. When mixed with iron, the following strengths in kg./cm.^{2}, which are normal, were obtained:

	Plastic mortar		Beaten mortar	
	Tens.	Comp.	Tens.	Comp.
At 2 days	12.5	75.5	21.4	119
At 7 days	21.7	177	31.3	206.3
At 28 days	33	225	37.2	298.5

When mixed with zinc, it was impossible to determine the strengths, for the specimens broke or cracked; the tests were repeated, with the same results. The chemical composition of the zinc was as follows: Silicon, 0.02%; lead, traces; copper, 0%; arsenic, traces; sulphur, 0%; iron, 0.14%; zinc (by differences), 99.84%. The metal contained no impurities able to exert a detrimental action on the cement. Hence the influence of the metal itself or of one of its compounds upon the set and hardening of cement was studied.

In the case of blast furnace cement mortar, when 1% ZnO, figured on the basis of dry mortar, was added, the specimens disintegrated in water and behaved like those to which zinc had been added; when 0.5% ZnO was added, the specimens disintegrated and likewise when 0.1% ZnO was added. With additions of 0.01% ZnO, the specimens did not disintegrate, but their strength at 2 days decreased somewhat, the 7- and 28-day being normal. In the case of iron portland cement mortar, when 0.1% ZnO was added, hardening was somewhat slower, but the behavior to water and the strengths were normal. In general, the mortars containing ZnO hardened very slowly in the air, the oxide acting without doubt as a retarder; a very small percentage of ZnO suffices to modify the initial hardness of the blast furnace cement. It is concluded that the zinc taken off the zinc plate by the sand during the mixing of the mortars enters in reaction with the lime liberated during the set.

Tests conducted at the Lafarge plant by Rengade showed also that the minute quantities of ZnO act detrimentally upon the

initial hardening of the basic slag or "laitier" cements, and that the result may be an incorrect interpretation of the true value of certain cements. Test results on an artificial Lafarge cement were as follows:

	Setting period	
	Start	End
Clean specimen	4 hr. 45 m.	11 hr. 40 m.
Adding 1% ZnO*	21 hr. 10 m.	42 hr.
Adding 0.1% ZnO	7 hr.	19 hr. 45 m.

	Tensile strength		
	2 da.	7 da.	28 da.
Clean specimen	12.8	28.8	30
Adding 1% ZnO*	.....	29.8	40
Adding 0.1% ZnO	.....	17	....

*In percent. of cement.

The zinc oxide did not appear to have any influence upon the fused or alumina cement; the time of set did not change and the strengths were not changed appreciably. In adding zinc oxide to lime, the set was very much retarded; and the strengths were affected, but much less than those of cement. Addition of zinc oxide to extra white cement retarded the set considerably; the normal tensile strength of the cement was 9.2 kg./cm.^{2}, but only 0.1 kg./cm.^{2} when 1% ZnO was added, 8 kg./cm.^{2} when 0.1% ZnO and 9kg./cm.^{2} when 0.01% ZnO was added. When adding zinc oxide to grappier cement the start of set was accelerated, the end retarded and the strengths decreased.—*Revue des Materiaux de Construction et de Travaux Publics* (1929) 239.

Packaging of Cement. Luftschitz shows that a normal cement packed in paper sacks may test true to an early strength cement due to the effect of the moisture content of the sack upon the cement in it. The rate of set of any number of sacks of cement in a shipment may thus be affected unless, perhaps, the air is dried while the cement is being packaged. It is suggested to replace the customary paper sack with a porous container to permit aeration of the cement while in the package. Various types of containers, including wooden kegs and boxes, should be tested to determine their effect on the rate of set of the cement after given periods of storage. A cement that has been deadened or "sanded" in the package, say, to 10% of the amount, requires more water and this affects the mixing proportions for the mortar. Many failures of concrete structures could perhaps be traced to the use of a shipment of cement, of which some sacks of cement have become "rapid-set" and the others retained their normal set.—*Tonindustrie-Zeitung* (1929), **53**, 84.

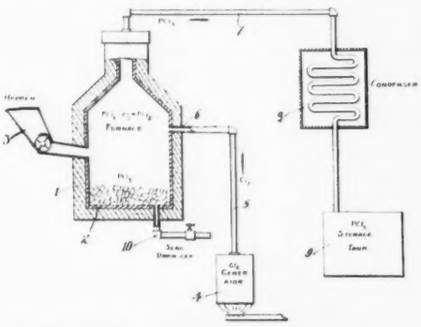
Shaft Kiln with Continuous Draw Apparatus. A gas-fired shaft kiln is provided with endless conveying grates located beneath each discharge opening; the grates are operated by a common drive and deliver the material towards the center beneath the kiln, and thence to the bins for large and small size burned material.—*Wilhelm Mueller, German Patent No.* 482,111.

Recent Research on Cement and Concrete. Otto Graf discusses recent research on cement, cement mortars and concrete, in a general way.—*V. D. I. Zeitchrift*, **73**, 39.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Production of Phosphorous Chloride from Rock Phosphates. Rock phosphate, silica and coke are ground to about 20 mesh or more and pressed into the form of briquets. The briquets are then introduced into the furnace *1* through the hopper *3* through which fuel may also be introduced into the furnace *1*. The briquets are then heated in the furnace *1* to a red to white heat in a reducing atmosphere while the chlorine is being introduced into the colder part thereof. The phosphorus pentachloride formed may be conducted through the condenser *8* to the



Apparatus for production of phosphorous chloride from rock phosphate

storage tank *9* or may be directly employed in other processes or otherwise disposed of.

Best results are obtained when a silica to lime ratio of about 61 to 39 is used; this is approximately the same proportion as is represented by calcium trisilicate ($Ca_2Si_3O_8$). This ratio gives readily fusible slag with a more complete evolution of phosphorous chloride. The reaction in the furnace goes according to the following equation:

$Ca_3(PO_4)_2 + 3SiO_2 + 5C + 5Cl_2 = 3CaSiO_3 + 2PCl_5 + 5CO$, the PCl_5 forming in two successive stages.—*Claude G. Miner, U. S. Patent No.* 1,730,521.

Gypsum Plaster Accelerator. The invention relates to a method of accelerating the set of gypsum plaster and at the same time of reducing the linear expansion. This is accomplished by thoroughly mixing 1000 lb. of plaster with 84 lb. of dry powdered boric acid. While this mass is in agitation a solution of 16 lb. boric acid in 60½ lb. of hot water is slowly sprinkled into it. The agitation is continued for about an hour.

The mixture is allowed to stand for a day or two until the material is thoroughly dry and the water all absorbed by the plaster as water of crystallization. The dried mass is then pulverized and mixed. This accelerator and expansion controller is then mixed in any desired proportion with a body of plaster to form the plaster composition. It has been found that a composition made of 1200 lb. of plaster having mixed therewith 18 to 46 lb. of the accelerator and expansion controller has a linear expansion during setting of only 8 parts in 50,000, while pure plaster has a corresponding expansion of 120 parts in 50,000. Furthermore, a cast made with the new plaster composition is 25% harder than a cast made from pure plaster and the new plaster composition will set in four minutes instead of the usual time required for the setting of plaster.—*John D. Wiggin and Mathias M. Remmes, assignors to H. B. Wiggin's Son's Co., U. S. No.* 1,732,737.

Classifier. A rake classifier has a corrugated bottom, the corrugations forming pockets which are emptied by curved scrapers. The scrapers have a circular motion of the same shape as the curved pockets, so that the pocket is scraped out cleanly at each back and forth motion. The inventor claims that this allows coarse material to be thoroughly turned over so that the water can act on it. It also prevents heavy material from accumulating in the bottom and damaging the machine.—*F. B. McConville, U. S. Patent No.* 1,726,404.

Plaster Board Edge Protection. The inventor describes a method of drying wallboard so that the edges are dried at the same time as the body of the board. This is accomplished by equipping the kiln with a series of baffles that prevent the edges of the board drying out first.—*Monroe Rule, U. S. Patent No.* 1,730,629.

High Alumina Cement. Materials such as will produce a cement analyzing about 40% alumina, 40% lime and the balance iron and silica are used in the process. The unground raw materials, in the lump size they come from the quarry, are mixed in the desired proportions and passed to a rotary kiln. Within the kiln the lumps are broken up while at high temperature, thus exposing fresh surfaces continually for contact with the hot gases; this action permits a fusing and intimate mixing of the disintegrated particles.

The inventor claims that the mechanical breaking and mixing of the lumps in the rotary kiln is more economically effected than the grinding and mixing while cold, thus avoiding the necessity for this previous and usual fine grinding before firing. The disintegrated mass is brought to fusion within the kiln, then cooled and ground in the usual manner.—*Bruno Bruhn, assignor to G. Polysius Co., U. S. No.* 1,741,973.

Pulverized Fuel Distributing Apparatus. The system comprises mechanism which by centrifugal action distributes the fuel laden air from a central or main conduit to several nozzle conduits. These pipes extend to separate burners or places of consumption. Distribution of the powdered fuel is controlled so that each conduit receives a uniform supply. The mechanism may be incorporated in the usual pulverized fuel burning systems.—*G. W. Denison, U. S. No.* 1,741,181.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended Dec. 28	Limestone Flux Week ended Jan. 4	Sand, Stone and Gravel Week ended Dec. 28	Sand, Stone and Gravel Week ended Jan. 4
Eastern	990	1,664	1,314	1,605
Allegheny	1,449	1,935	1,539	2,340
Pocahontas	77	148	211	396
Southern	311	428	2,457	4.433
Northwestern	285	253	727	1,046
Central Western	347	358	4,223	5,373
Southwestern	287	300	2,421	3,991
Total	3,746	5,086	12,892	19,184

COMPARATIVE TOTAL LOADINGS FOR THE FULL YEAR, BY DISTRICTS, 1928 AND 1929

District	Limestone Flux 1928	Limestone Flux 1929	Sand, Stone and Gravel 1928	Sand, Stone and Gravel 1929
Eastern	150,964	165,149	554,163	552,840
Allegheny	176,420	178,313	375,341	366,373
Pocahontas	22,951	18,871	41,375	50,293
Southern	30,115	31,177	539,403	440,471
Northwestern	64,814	55.114	322.293	304,142
Central Western	23,048	26,971	509,539	531,140
Southwestern	20,839	25,617	325,046	348,316
Total	489,151	501,212	2,667,160	2,593,575

COMPARATIVE TOTAL LOADINGS FOR THE FULL YEAR, 1928 AND 1929

	1928	1929
Limestone flux	***489,151***	***501,212***
Sand, stone, gravel	***2,667,160***	***2,593,575***

COMPARATIVE TOTAL LOADINGS, 1929 AND 1930

	1929	1930
Limestone flux	***6,337***	***5,086***
Sand, stone, gravel	***19,245***	***19,184***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning January 25:

CENTRAL FREIGHT ASSOCIATION DOCKET

23719. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads (See Note 3), from Lafayette, Ind., to points in Indiana, rates as shown below. Present and proposed rates (rates in cents per net ton):

To	Proposed	Present
New Haven, Ind.	90	101
Woodburn, Ind.	90	340

Route—via Wabash Ry. direct.

23727. To establish on **stone**, crushed, in bulk only; **crushed stone screenings**, in bulk only, carloads; **limestone, agricultural** (not ground or pulverized), in bulk, in open-top cars only, carloads; **stone tailings**, carloads (See Note 3), from Narlo, O., to Simons, O., rate of $1.40 per net ton. Route—Via N. Y. C. & St. L. R. R., Ashtabula, O., N. Y. C. R. R. Present rate, $1.50.

23728. To establish on **stone, crushed**, in bulk, in open-top cars, carloads (See Note 3), from Cedarville, O., to Eaton, O., rate of $1 per net ton. Present rate, 21½c.

23741. To establish on **sand and gravel**, carloads (See Note 3), from Fairview and Swanville, Penn., to Gilfoyl, Penn., rate of $1.40 per net ton. Present rate, 20c.

23746. To establish on **sand and gravel**, carloads (See Note 3), from Chillicothe and Rittenours, O., to Jackson, O., rates as shown below, in cents per net ton:

From—	Proposed rate	
Chillicothe, O., to Jackson, O.	(1)	70
	(2) (4)	80
Rittenours, O., to Jackson, O.	(2)	80
	Present rate	
Chillicothe, O., to Jackson, O.	(1) (2) (3)	70
Rittenours, O., to Jackson, O.	(5) (2)	80

(1) Applies via B. & O. R. R. direct.
(2) Applies via Thrifton, O., and D. T. & I. R. R.
(3) Applies for H. V. Ry. delivery.
(4) Cancel as being obsolete account no movement.
(5) Applies only on gravel.

23752. To establish on **sand** (all kinds) and **gravel**, carloads (See Note 3), from Wapakoneta, O., to Celina, O., rate of 70c. No switching to be absorbed at Wapakoneta, O. Present, 9½c.

23755. To amend Item No. 1365 of C. F. A. L. Tariff No. 104P, I. C. C. No. 2100, which names proportional rate of $2.75 per net ton on **sand**, all kinds, from the six origin points in the Ottawa, Ill., district to Ohio river crossings, also Thebes and Thebes Transfer of the Mississippi river, by providing for an exception for account of the C. & E. I. Ry. That rate in question will not apply to Evansville, Ind., via the C. & E. I. Ry. on silica sand, either crude or washed or processed, via routes shown in Agent Boyd's Tariff No. 41Q.

23756. To establish on **sand and gravel**, carloads (See Note 3), from Attica, Ind., to Edwardsville, Ill., rate of $1.01 per net ton. Present rate, $1.13 per net ton.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

23748. To establish on **agricultural limestone**, in box cars, carloads, minimum weight 60,000 lb., from Gibsonburg and Woodville, O., to points in Indiana, rates as illustrated in Exhibit A attached. Present rates, 60% of sixth class.

EXHIBIT "A"

Representative destinations in Indiana:

	Pres. rate	Prop. rate		Pres. rate	Prop. rate
Alida	250	230	Magee	*250	220
Belfast	250	220		†240	
Columbia City	189	190	Milford Jct.	220	200
Ft. Wayne	189	190	N. Liberty	230	200
Griffith	260	240	Plymouth	202	200
Hartsdale	260	240	Rochester	230	220
Howe	*220	190	Stroh	200	190
	†200		S. Whitley	200	190
Kendallville	*200	180	Valparaiso	250	230
	†190		Waterloo	*190	160
Knox	250	220		†180	
LaGrange	*220	190	Westville	250	230
	†200		Woodburn	200	190
La Pax Jct.	220	200	Wilders	250	230
			Uniondale	200	200

*Gibsonburg. †Woodville.

23764. To establish on **sand, viz., blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica**, carloads (See Note 3), from Centreton and Campbells, Ind., to Auburn, Butler, Garrett and Kendallville, Ind., rate of $2.14 per net ton. Present rates:

To	Present	Proposed
Auburn, Ind.	$2.39	$2.14
Butler, Ind.	(a) 2.52	2.14
Garrett, Ind.	(b) 2.90	2.14
Kendallville, Ind.	(c) 2.52	2.14

(a) Intermediate to Detroit, Mich.
(b) Intermediate to Sandusky, O.
(c) Intermediate to Sturgis, Mich.

23765. To establish on **crushed stone**, carloads (See Note 3), from Melvin, O., to Torch Hill, Little Hocking, Porterfield and Belpre, O., rate of $1 per net ton. Present rate, $1.40 per net ton.

23750. To establish on **sand and gravel**, carloads (See Note 3), from Kaley Pit (South Bend), Ind., to destinations in Indiana on the Chicago, Indianapolis and Louisville Ry., the New York, Chicago and St. Louis R. R. and the Pere Marquette Ry., rates as shown in Exhibit B attached. Present—No specific commodity rates in effect at present, classification basis applying.

EXHIBIT "B"

Proposed Rate in Cents Per Net Ton From Kaley Pit, South Bend, Ind., C. S. S. & S. B. R. R. To (C. I. & L. Ry.)—

Route via Michigan City, Ind.

Gleason	80	San Pierre	95
Otis	85	Anthonys	100
Alida	85	Clarks	100
Haskells	85	Medaryville	100
Wanatah	90	Francesville	105
South Wanatah	90	Monon	110
LaCrosse	95	Rensselaer	110
Wilders	95	Dinwiddie	120

Route via Hammond, Ind.

Dyer	100	Shelby	110
St. John	105	Thayer	110
Cedar Lake	105	Rose Lawn	110
Creston	105	Fair Oaks	110
Lowell	110		

N. Y. C. & St. L. R. R.

Route via Michigan City, Ind.

Belfast	76	Kankakee	80
LaPorte	76	Walkerton	82
Stillwell	76	Tyner	82
Dillon	80	Plymouth	82

Pere Marquette Ry.

New Buffalo*	85	Wellsboro†	95
Union Pier*	85	Hanna†	95
Lake Side*	85	Thomaston†	95
Sawyer*	90	LaCrosse†	100
LaPorte†	90		

*Michigan. †Indiana.

23761. To establish on **sand and gravel**, carloads (See Note 1), from Lafayette, Ind., to points in Illinois, rates as shown below. Present and proposed rates from Lafayette, Ind. (per net ton):

To	Pres. rate	Pro. rate	To	Pres. rate	Pro. rate
Gilman	280	115	Leverett	290	115
Onarga	123	115	Champaign	290	115
Del Rey	123	115	Gibson City	88	.....
Buckley	118	115	Harpster	330	115
Lodi	112	.....	McNulta	330	115
Paxton	70	.....	Belleflower	330	115
Ludlow	290	115	Kumbler	330	115
Rantoul	290	115	Weedman	330	115
Thomasboro	290	115	Farmer City	330	115

23781. To establish on **crushed stone and crushed stone screenings**, carloads (See Note 3), from Apex, O., to points in Ohio, rates as illustrated in Exhibit "A" attached. Present rates—Classification basis apply.

EXHIBIT "A"

Crushed stone from Apex, O., to points on:

P. S. M. 923

	Prop. scale		Prop. scale
Penna. R. R. (Ohio points)			
Highland Springs	100	Waynesburg	90
Selineville	95	Dover	100
E. Liverpool	105	Newcomerstown	115
Empire	105	Crystal Springs	100
Brilliant	115		

15329 Two Line Scale

Vanport, Penn.	130
Chester, W. Va.	140
Brownsdale, W. Va.	130
Weirton, W. Va.	130

P. S. M. 923

N. Y. C. R. R. (Ohio points)			
Palmyra	90	Bergholz	70
Mt. Union	80	Piney Fork	70
Minerva	70		
W. & L. E. R. R. (Ohio points)			
Chagrin Falls	105	St. Clairsville	80
Unionvale	70		

15329 Two Line Scale

P. & W. Va. R. R. (Penna. points)			
Virginia	100	Bower Hill	120
Woodrow	110		

P. S. M. 923

B. & O. R. R. (Ohio points)			
Burton	105	South Akron	135
Ravenna	125		
Erie R. R. (Ohio points)			
Summit	135	Kent	105
West Salem	125	Pavonia	135
Barberton	115		

23766. To establish on **sand and gravel**, carloads (See Note 3), from Ohlton, O., to Cuyahoga Falls, O., rate of 85c per ton of 2000 lb. Present rate—

90c per ton, applying to Peninsula, O., to which point Cuyahoga Falls, O., is intermediate.

23775. To establish on **sand, viz., lake, river and bank,** other than sand loam, carloads (See Note 3), from Gary, Ind., to Connersville, Ind., rate of $2.02 per net ton. Routes—Wabash, New Paris, Ind., C. C. C. & St. L. Ry.; Wabash, Ft. Wayne, Ind., N. Y. C. & St. L. R. R.; Wabash, Dillon, N. Y. C. & St. L. R. R. Present rate, 21c.

23778. (A) To establish on **crushed stone and crushed stone screenings,** carloads (See Note 3), from East Liberty, O., to Edison, O., rate of 85c per net ton. Route—N. Y. C., Marysville, C. C. C. & St. L. Ry. Present rate—Classification basis. (B) To cancel present rate of 85c per net ton now in effect via N. Y. C. direct and apply in lieu thereof sixth class rate of 13½c.

23785. To establish on **agricultural limestone (refuse lime)** in bulk, carloads (See Note 3), form Milltown, Ind., to destinations in Illinois and Indiana, rates as shown in Exhibit A attached, in lieu of the class rates now applicable.

EXHIBIT "A"

From Milltown, Ind.
(Rates in cents per net ton.)

To Illinois and Indiana points:

	Rates	Route		Rates	Route
B. & O. R. R.					
Bridgeport	135	1	Gilmore	130	1
Noble	125	1	Flora	120	1
Greendale	125	1	Barn Hill	115	1
Sandoval	130	1	Sacramento	125	1
Breese	140	1	Bartley	130	1
O'Fallon	140	1			
C. C. C. & St. L. Ry.					
Lawrenceville	110	2	Crossville	110	2
Schrodts	110	2	Gossett	120	2
I. C. R. R.					
Armstrong†	110	3	Greenup	130	4
Barrett†	110	3	Newby	135	4
Bone Gap	110	4	Watson	130	4
Dundas	120	4	Kinmundy	135	5
Boos	120	4			
L. & N. R. R.					
Belknap†	110	6	Beaucoup	130	7
Upton	110	6	Queens Lake	135	7
Enfield	120	6	French Vil.	140	7
Belle Rive	130	6			

Present rates—Class rates.
†Indiana.

23786. To establish on **sand and gravel,** carloads (See Note 1), from Merom, Riverton, Ind., and Palestine, Ill., to Greencastle, Ind., via I. C. and C. I. & L. R. R.'s, rate of $1.10 per ton of 2000 lb. Present rate—Classification basis applies.

23787. To establish on **stone, waste,** viz., breakwater, chip, grout, rip rap and spauls, carloads, (See Note 3), from Romona, Ind., to Michigan City, Ind., via M. C. R. R., rate of $1.51 per net ton. Present rate, $4 per net ton.

23789. To establish on **dolomite, raw or crude, and stone, fluxing** (in open top cars only) carloads (See Note 3), following rates, from Apex, O., to Bellaire, O., 43c; to Dover, O., 46c, and to Martins Ferry, Steubenville, Newton Falls and Yorkville, O., and Wheeling, W. Va., 92c per net ton. Present rates—Classification basis applies.

23792. To establish on **refuse limestone screenings and quarry scrap,** carloads (See Note 1), except when car is loaded to full cubical capacity actual weight will apply, from Hillsville, Penn., and Walford, Penn., to Neville Island, Penn., rate of 60c per ton of 2000 lb. Present rate, 70c per ton of 2000 lb.

23798. To cancel commodity rates on **molding sand,** carloads, from Greenup, Ill., to C. F. A. and I. F. A. territories, applying in lieu thereof classification basis.

Sup. 1 to W. D. A. 23789. With reference to Docket Advice 23789, pertaining to establishment of rates on **raw or crude dolomite, etc.,** from Apex, O., to points in Ohio and West Virginia, we supplement this docket advice by the addition of the following points of destination:

To	Pres. rate	Pro. rate
Barberton, O.	14	92
Canton, O.	13	92
Massillon, O.	13½	92
Weirton, W. Va.	14	113

23802. To establish on **sand and gravel,** carloads (See Note 3), from Terre Haute, Ind., to Oakland City, via E. I. & T. H. Ry., rate of 85c per net ton. Present rate, 95c per net ton.

23804. To establish on **common sand and gravel,** carloads (See Note 3), from Fairview and Swanville, Penn., to Sandy Lake, Penn., rate of $1.10 per net ton. Present rate, 14½c.

23807. To establish on **crushed stone,** carloads, (See Note 3), from Lewisburg, O., to Lawrenceburg, Ind., rate of $1 per net ton. Present rate, $1.05 per net ton.

23811. To establish on raw or crude **dolomite stone,** carloads (See Note 3), from Carey and McVittys, O., to Fairmont, W. Va., rate of $2.06 per gross ton. Present rate, $3.28 per gross ton.

TRUNK LINE ASSOCIATION DOCKET

22645. **Limestone, agricultural and ground; limestone dust, pulverized limestone and precipitated limestone,** carloads, minimum weight **50,000 lb.,** from Buffalo, N. Y., to Salamanca and Limestone, N. Y., 5c per 100 lb. (Note a.) **(Present, rate 91c** per net ton.) Note a—Rates on ground and agricultural limestone apply on intrastate and ex-lake traffic only. Reason: Proposed rate is comparable with rate to West Salamanca, Elkton and Little Valley, N. Y.

22648. **Crushed stone,** carloads (See Note 2). Rates in cents per net ton. From Beavertown, Penn., to Centralia, Penn., proposed rate 130, present rate 160; from Dalmatia, Penn., to Centralia, Penn., proposed rate 115, present rate 150; from Dalmatia, Penn., to Ashland, Penn., proposed rate 130, present rate 160; from Dalmatia, Penn., to Bloomsburg, Penn., proposed rate 125, present rate 150; from Dalmatia, Penn., to Rupert, Penn., proposed rate 115, present rate 140. Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

22650. **Sand,** other than blast, engine, foundry, moulding, glass, silica, quartz or silex, carloads, **and/or gravel,** carloads (See Note 2), from Carpenterville, N. J., to Mauch Chunk, Penn., $1.15 per net ton. Present rate $1.40 per net ton. Reason—Proposed rate compares favorably with rates from Carpenterville to Bound Brook, N. J., and Andreas, Penn., and from Morrisville, Penn., to Newark, N. J.

Sup. 1 to 22560. Establish rate on **ground limestone,** carloads, minimum weight 50,000 lb., from B. & O. R. R. producing points in the Grove, Frederick, Security, Md.; Engle, Martinsburg, Charles Town, W. Va.; Winchester, Cedar Creek and Strasburg Junction, Va., districts to N. Y. N. H. & H. R. R. points on basis of ½c under present lime rates.

22671. **Sand and gravel,** carloads (See Note 2), from Farmingdale and South Lakewood, N. J., to Irvington, N. J., $1.10 per net ton. (Present rate $1.27 per net ton.) Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

22675. **Limestone, ground, precipitated or pulverized, and limestone dust,** carloads, minimum weight 50,000 lb., from Atlas, Hamburg and Lime Crest, N. J., to River Forks, N. Y., to New Berlin, N. Y., inclusive, 12c per 100 lb. Present rate, 14c per 100 lb. Reason—Proposed rate is comparable with rates to North Brookfield, Richfield Springs, Utica, N. Y., etc.

22687. **Gravel and sand,** N. O. I. B. N., in O. C., except blast, engine, foundry, glass, molding, quartz, silex and silica (See Note 2), from Portland, Penn., to Water Gap, Penn., 60c per net ton. (Present rate 70c per net ton.) Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

22688. To increase rate of 90c to $1 per net ton applying on **crushed stone,** carloads (See Note 2), from Canoe Creek, Stone Co., Penn., to Cush Cushion to Sample Run Mine, Penn., inclusive. Reason—Proposed rate conforms with the mileage scale prescribed in P. S. C. Penn. Dockets 7651 and 7943.

22689. **Ganister stone,** carloads (See Note 2), from Flowing Spring, Penn., to Claysburg and Sproul, Penn., 75c per net ton. (Present rate 6c per 100 lb.) Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

22692. **Crushed stone,** carloads (See Note 2), from Monocacy, Penn., to Wilkes-Barre, Penn. (A) $1.65 and (B) $1.75 per net ton. Reason—Proposed rate is comparable with rate from Monocacy, Penn., to Baltimore, Md., Marysville and Dauphin, Penn.

22695. To increase rate of 70c per net ton to 80c per net ton applying on **sand and gravel,** other than blast, engine, foundry, glass, molding or silica, carloads (See Note 2), from Pompton Plains, N. J., to Jersey City, Weehawken and Croxton, N. J. Reason: To place the rates on comparable basis with those published from adjacent territory.

22696. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads, **and/or gravel,** carloads (See Note 2), from Carpenterville, N. J., to Egypt, Lesley, Ormrod, Saveor and West Coplay, Penn., $1.05 per net ton. (Present rate sixth class rate.) Reason: Proposed rate is comparable with rate from Carpenterville, N. J., to Coplay, Slatington and Siegersville, Penn., and from Springtown, N. J., to Ormrod and Siegersville, Penn.

22718. To cancel present commodity rates on **sand,** molding, common and filtering, carloads, minimum weight 40,000 lb., published in Items 1985 and 1968 of Agent Curlett's I. C. C. A-260 from Albion, N. Y., to various points in the states of Georgia, Florida, Tennessee and South Carolina and apply in lieu thereof sixth class rates as per Agent Curlett's I. C. C. A-200. Reason: Investigation develops that these rates were first published from Albion, New Jersey in Supplement No. 23 to Agent Cottrell's I. C. C. No. 383, effective October 15, 1923, and were reissued in Agent Cottrell's I. C. C. No. 469, from Albion, N. Y., in error, and the purpose of this proposal is to eliminate rates from Albion, N. Y.

22527. **Sand,** carloads (See Note 2), from Pinewald, Quail Run, Toms River, Cedarville, Cedar Lake, Newport, Dividing Creek and Mauricetown to Dalhouse, N. B., 41c per 100 lb.

22720. **Crude fluxing limestone,** carloads (See Note 2), from Knickerbocker and Devault, Penn., to Florence, N. J., $1.26 per gross (see note).

Note—Applies only when shipped in open top equipment. During period of car shortage when open top equipment is not available and closed equipment is furnished at carrier's option, the rates provided for open top equipment will apply. Reason—Proposed rate is comparable with rate from Rambo, Penn.

22675. **Limestone, ground, precipitated or pulverized and limestone dust,** carloads, minimum weight 50,000 lb., from Ogdensburg, N. J., to River Forks, N. Y., to New Berlin, N. Y., inclusive, 12c per 100 lb.

22746. **Broken stone,** carloads (See Note 2), from West Manayunk, Penn., to Jersey City, N. J., $1.60 per net ton. (Present rate $2.40 per net ton.) Reason—Proposed rate is comparable with rate from Holmesburg, Tacony and Foxcraft, Penn., to Jersey City, N. J.

22751. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads, **and/or gravel,** carloads (See Note 2), from Carpenterville, N. J., to West Penn, Penn., $1.15 per net ton. (Present rate $1.40 per net ton.) Reason—Proposed rate is comparable with rates on like commodities from Carpentersville, N. J., to Bound Brook, N. J., and Andreas, Penn., and from Phillipsburg, N. J., to Nesquehoning, Penn.

22762. **Glass sand,** carloads **(See Note 2),** from Tatesville, Penn., to Waterbury, Conn., Valley Falls, R. I., $4.30, Huntington, W. Va., $2.60 and Weston, W. Va., $2.25 per net ton. (Present rates, 6th class rates.) Reason—Proposed rates are comparable with rates from Mapleton District, Penn., to Boston, Mass., Huntington and Weston, W. Va.

22692. **Crushed stone,** carloads (See Note 2), from Birdsboro, Trap Rock and Rock Hill, Penn., to Wilkes-Barre, Penn., $1.65 and $1.75 per ton.

SOUTHERN FREIGHT ASSOCIATION DOCKET

48747. **Limestone or whitestone,** from Whitestone, Ga., to Alabama points. It is proposed to establish rates on limestone or whitestone, ground, powdered or pulverized, carloads, minimum weight 60,000 lb., from Whitestone, Ga., to Alabama destinations, on basis of the Georgia-Alabama scale, less 10% for the distances involved, subject to the I. C. C. Docket 19943 scale as minimum. Statement of present and proposed rates to destinations to which it is proposed to establish rates at present will be furnished upon request.

48799. **Crushed stone,** from Boxley, Va., to Southern Ry. Norfolk Division stations. Emporia, Va., combination now applies. It is proposed to publish rates on crushed stone, carloads (See Note 3), on basis of the joint trunk line scale prescribed by the Interstate Commerce Commission in Docket 17517 from Boxley, Va., to Southern Ry. stations between Norfolk and Danville, Va., for intrastate application.

ILLINOIS FREIGHT ASSOCIATION DOCKET

4434. **Stone, crushed** (See Note 2), **but not less** than 40,000 lb., from Cincinnati, O. (ex Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina and Virginia), as shown on pages 32 and 33 of Agent Jones' Tariff 109G, I. C. C. 1818, to various destinations in Minnesota and Wisconsin, viz., St. Paul, Duluth Junction, etc., Minn., Anson, Elmwood, Knapp, etc., Wis. Rates in cents per net ton. Present rate, $5.20; proposed, $4.22.

I. R. C. 5433. **Chert, clay, flintstone, silica and/or silica sand, crude or ground,** in bulk or in packages, straight or mixed, carloads (See Note 2), from Cox, Ill. Rates per net ton.

To	Present	Proposed
Brookport, Ill.	*	$2.24
Cairo, Ill.	*	1.68
Metropolis, Ill.	*	2.24
Paducah, Ky.	*	2.84
Thebes, Ill.	*	1.36

*Class or combination.

WESTERN TRUNK LINE DOCKET

2079. **Stone, rubble (rough, broken, irregular pieces,** not machined or tooled) (See Note 2), except that when weight of shipment loaded to full visible capacity is less than 90% of marked capacity, actual weight will apply, but in no case shall minimum weight be less than 40,000 lb., from Lannon and Waukesha, Wis., to St. Clair, Mich. Present—Sixth class. Proposed—$2.36 per net ton.

2079-M. **Stone, rubble (rough broken,** irregular pieces, not machined or tooled) (See Note 2), except that when weight of shipment loaded to full visible capacity is less than 90% of the marked capacity, actual weight will apply, but in no case shall the minimum weight be less than 40,000 lb., from Lannon, Wis., to Crown Point, Rochester, Plymouth and Fort Wayne, Ind. Present—class rates. Proposed:

To		To	
Crown Point	$1.81	Rochester	2.31
Plymouth	2.19	Fort Wayne	2.56

Manitowoc Cement Company Holds Safety Meetings

THE OPERATING department of the Manitowoc Portland Cement Co. held its semi-annual safety dinners on December 18 and 19 at the K. of C. club house, Manitowoc, Wis.

The idea of holding two identical dinner parties on successive evenings was to permit all employes to be present and at the same time continue 24-hour operation of the mill.

H. Vanderwerp, vice-president of the Manitowoc company, presided as general chairman and F. E. Town, superintendent, acted as song leader.

P. G. Dawson, secretary of the Medusa Portland Cement Co., of which the Manitowoc company is a subsidiary, who has been secretary of the Manitowoc company until recently, emphasized the interest the company has taken in the safety of its employes since operation began six years ago and issued a challenge to the mill organization to complete 1930 without accident. This challenge was accepted by unanimous vote.

Supt. F. E. Town outlined safety methods and told the men that the present safety rules, as drastic as they may seem, would be enforced to the letter as intended by the safety committee which devised them. These rules provide for the discharge of any employe found guilty of carelessness in connection with an accident. The outside speakers who went to Manitowoc for the occasion were W. M. Powell, safety director of the Medusa Portland Cement Co., Cleveland, and A. J. R. Curtis, assistant to general manager of the Portland Cement Association, Chicago.

Following Mr. Powell's talk, short addresses were made by A. B. Pfeifer, general auditor of the Medusa company, and R. E. Minogue, assistant superintendent and chairman of the Manitowoc safety committee.

Mr. Minogue outlined the efforts of the committee and told of its struggles during the last few years, during which period there has been an increasing number of accidents. According to Mr. Minogue the safety committee decided that extreme action was necessary and at its meeting early in November put into effect the following rules, which are perhaps the most stringent in the cement industry:

Manitowoc Safety Regulations

1. No new employe shall be given a time card till he has first passed the physical examination and then read and signed the safety code.
2. Every new employe shall be thoroughly instructed in our safety code and rules by the chief chemist or his assistant, and his signature taken as a pledge to its strict observation.
3. Every old employe who has not already so pledged himself will be asked to do so within three days of date on which these rules are made effective.
4. The slightest scratch, bruise, burn, cut, strain or injury of any kind must be reported to both your foreman and to the laboratory for a record, within an hour, or much sooner if possible, after noticing such and injury and proper first-aid treatment received.
5. If any injury requires professional services during laboratory hours, an order for such services must first be secured from the laboratory. Otherwise your foreman must make arrangements for the doctor and the order secured as soon thereafter as possible.
6. The company will not care to be responsible for the payment for professional services unless the injury, however slight it may be, was reported at the time it happened.
7. Attendance at all departmental safety meetings is obligatory by everyone, unless previously excused by your foreman. Failure to attend unless excused will require your attendance at the first general safety meeting following, to answer all questions and explain reason for your lack of interest in safety measures. Your name will be posted on the bulletin boards for non-attendance.
8. Any employe who suffers a lost-time accident must appear before a safety court of inquiry before being permitted to return to work. If carelessness, or failure to comply with safety rules, or indifference on the part of the injured to the safety program of the company is found to exist, the court may recommend immediate dismissal from the services of the company, or the executive in charge of employment may dispense with employe's services at his own discretion, regardless of court's findings or take any other steps he may think fitting. A careless or indifferent employe is at all times an undesirable employe, and his services should be dispensed with.
9. If the inquiry shows the accident resulted from someone else's carelessness or neglect, that employe, whoever he may be, will also be summoned before the safety court and dealt with in like manner at the discretion of the court.
10. The safety court of inquiry shall be composed of superintendent (or assistant during his absence), the mill foreman on 7 o'clock shift, chief engineer of power, one repair man, one man from clay field, one from yard and dock and one man from the packing department.

"We cannot *force* a man to work safely and without accidents, but we *can* and *will* remove such careless men from our payrolls."

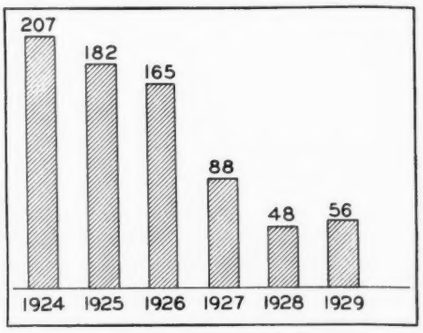
Six Midwest Stone Companies in Merger

CONSOLIDATION of the Western Limestone Products Co. of Omaha, Neb., with five other limestone products organizations of the Middle West under the name of the Calcium Carbonate Corp., incorporated under Delaware laws, was announced by H. E. Schellberg, president of the Omaha company.

Companies included in the merger are the Independent Gravel Co. of Hannibal and Joplin, Mo.; Carthage Crushed Limestone Co. of Carthage, Mo.; Peerless White Lime Co. of St. Genevieve, Mo.; Reliance Whiting Co. of Alton, Ill., and the Black White Limestone Co. of Quincy, Ill. B. D. Reynolds, Joplin, Mo., is president.—*Chicago* (Ill.) *Tribune.*

December Accidents in the Portland Cement Industry

DURING December, 1929, there were more recordable accidents in the cement mills reporting to the Portland Cement Association than during December of 1928, reversing the downward trend which has been



Lost time accidents in the portland cement industry during December

a noticeable feature of the monthly accident reports of the industry.

Accidents during the closing month of 1929 totaled 56 of all classes. There were no fatal accidents in the cement mills or quarries. The single fatality of the month occurred when a deckhand on a river barge slipped on the deck and was thrown into the water and drowned.

The most severe disability was caused when a locomotive fireman slipped on a frosty platform on the crusher trestle, throwing one foot under the locomotive driver, mashing his toes and necessitating amputation of the forepart of the foot.

Loss of time due to December accidents was noticeably lighter than usual.

Rousing Safety Meeting at Nazareth

THE meeting held on the evening of December 23, in the Broad street theater at Nazareth, Penn., under the auspices of the Nazareth Division of the Lehigh Valley Safety Council, was one of the largest in its history, approximately 850 people attending. The attendance represented a large percentage of employes of all the cement companies in and around Nazareth, and those of the Bates Valve Bag Co. Awarding of trophies to the winners of a four-month no lost-time accident campaign, conducted by the cement companies, was an important feature.

R. B. Fortuin, vice-chairman of the cement section of the National Safety Council, in an interesting address made a strong appeal for the greater promotion of the community safety idea.

Among the most interesting features were the three-minute talks by representatives of each of the cement companies, who told of the safety organization at their plants and how they managed to complete at least 365 days without a lost-time accident.

National Sand and Gravel Association Holds Annual Meeting at Memphis, Tenn.

WHILE OFFICIAL STATISTICS are not available at this writing, it would appear that more producers of sand and gravel attended the Memphis, Tenn., convention, January 28 to 30, than any previous meeting of the industry.

The officers elected were: President, R. J. Potts (president of the Potts-Moore Gravel Co., Waco, Tex.); vice-president, Harold V. Owens (president of the Eastern Rock Products, Inc., Utica, N. Y.); secretary-treasurer, H. S. Davison (general manager of J. K. Davison and Bro., Pittsburgh, Penn.); members of the executive committee, J. C. Buckbee (president of the Northern Gravel Co., Chicago), Alexander Foster, Jr. (vice-president of the Warner Co., Philadelphia, Penn.), Frank W. Peck (president of Muncie Sand Co., Kansas City, Mo.). The directors of the association are elected by their respective districts.

The following report of the convention may be roughly divided into four general subject heads: Business conditions, sales and distribution, ready-mixed concrete, association affairs.

R. J. Potts, new president, National Sand and Gravel Association

Business Conditions

Under the general subject of business conditions, was a paper by **W. C. Markham** (executive secretary, American Association of State Highway Officials) on "Road Construction During the Next Decade," which was read by the secretary and which dealt largely with matters of finance and the growing tendency for state highway departments to assume the construction and maintenance of constantly larger mileages of county roads. He said in part:

State Systems Should Be Surfaced Rapidly

"Because of the great variety of local conditions in this country we should study the road building program by localities rather than set down a general principle for the entire country as to what would be the most advantageous thing to do during the next decade. Naturally the first and most important item is to see that the state systems are surfaced as rapidly as possible. This will not only give immediate service to 75% of the users of the highways but will also enable the local communities to improve the feeder roads more rapidly. There are some states in which this program will be as much as can be accomplished during the next decade, but in others the program will be vastly different.

"A few states have already surfaced what would be a normal state system, but much of this surfacing is of an obsolete class; and, in fact, was not constructed to carry the loads now imposed upon it. In these cases a large amount of the funds available will be used for reconstruction, and in reconstructing these roads the states will be compelled to widen the pavement considerably. New York has set the example of taking over the entire county system of roads for improvement and doubtless other states in the same neighborhood will soon follow."

New Public Buildings Needed

Another paper bearing on general construction was delivered by **Thomas S. Holden** (vice-president in charge of the statistical division of the F. W. Dodge Corp., New York), extracts of which follow:

"The program of public building and public works advocated by the President is no mere recommendation for spending public money in order to get money into circulation. It is a program for meeting one of the most pressing demands of the country. In the years when private building activity was booming, public building and engineering work lagged far behind.

"Our per capita expenditures for building increased from $30.91 in 1919 to $65.77 in 1925, our peak year for building; this per capita increase amounted to 113%. During the same period per capita expenditures for civil engineering work increased from $5.82 in 1919 to $8.62 in 1925, only 48%. Even though our civil engineering expenditures continued to increase from 1925 through 1928, this class of work has not yet caught up with the country's demand. There has not been a year when the volume of public works operations has been equal to the country's logical requirements for this class of work. In spite of this continuous heavy demand, which should have brought about a marked increase in civil engineering work in 1929, there was actually a falling off; it was the first year since 1921 that saw a decline in volume of public works expenditures. The principal and immediate cause of this falling off was the continued and prolonged decline in the market for municipal bonds. There is today a big hold-over demand for this class of work, with many projects already planned that have not yet gone ahead, and many projects to be planned at early dates to meet urgent needs. The market for municipal bond issues has improved greatly in the past few months. With this encouragement and with the encouragement inspired by the President's business conferences and their attendant publicity, we may be well assured that expenditures for highways, flood-prevention, sewer projects, power developments and similar public improvements will be measurably increased in 1930. There will also undoubtedly be large increases in public building projects, many of them long needed and many already provided for by government appropriations. Expenditures for public improvements are likely to show more conspicuous increases in 1930 than any other class of work.

"While the general tone of business sentiment has been prevailingly optimistic during the past three months, there has been some under-current of pessimism, based upon conditions that have been admittedly bad, and to an even greater extent upon impatience and a desire to see immediate substantial betterment in construction activity.

Signs of Betterment Evident

"If we face the facts, we must admit that expecting immediate improvement in midwinter after such a serious upheaval as we have recently seen, is to ask for

the impossible. The bond market was in a state of chaos in November, and this was reflected in a December total of construction contracts that fell below any previous monthly total since February, 1925. But, both corporate and municipal bonds improved in December, and again in January. In spite of the low volume of contracts in December, the amount of contemplated expenditures for construction work reported in the plan stage during that month was 20% more than in November, and 19% over the amount reported in December, 1928. During the first 17 days of January, contracts in the 37 eastern states averaged practically $15,000,000 per business day compared with a little over $12,000,000 a day in December. This is particularly significant when we recall that January contracts normally fall below the amount let in the preceding December. Mortgage money is definitely easing up in New York, and should ease up elsewhere within a short time. The steel and electric equipment industries have been reported as showing improvement in January. These are the signs of betterment that we must look for today; the indications on which we must base our hopes of real improvement as the year's construction program shapes itself and reaches out toward an expanding rate of activity.

Speeding Up Construction

"And do not think that the President and his close advisers have been content to call conferences and give out optimistic statements to the press. A special bureau has been set up in the Department of Commerce to keep a check on the progress of public construction projects and to use every legitimate influence and means of persuasion to encourage the responsible officials to shorten the planning period, and get their projects ready for letting contracts. This bureau is receiving daily progress reports on individual projects and weekly statistical reports on the progress of contract-letting, and these reports are being placed before the President and cabinet every week. Mr. Hoover has fully realized that something more than optimistic talk was needed to get the construction industry pads to functioning at a normal rate.

Public Works and Public Buildings Mostly

"It is obvious from all this, that public building and engineering work is likely to play a much more important role in this year's construction program than it has for many years past. Reduced to a minor role in the years of fast expansion of private building work, it now comes back to the center of the stage. Since the products of your industry enter very largely into civil engineering construction, this year should offer you the prospect of a fairly considerable increase of business. This shift of emphasis toward public building and engineering work is likely to be the most conspicuous change noted in the trend of construction activity in 1930.

"Commercial and industrial building expenditures increased considerably in 1929. They usually do increase in a period when general business and stock-market activity are on the upgrade, and they are in consequence less likely to have further increase in 1930. Recent surveys have shown rather more than normal percentages of vacancies in large-type office buildings, and this class of work seems due for a quiet period in order that demand may catch up with supply. Manufacturing facilities are not likely to be increased greatly in the coming year, though plant modernization and installation of cost-reducing machinery and processes are likely to proceed at a satisfactory rate. Large industrial and commercial organizations have ample funds for plant extensions but fear of creating surplus plant facilities is apt to curb factory buildings of most classes again in 1930. But, if there should be decreases in factory building expenditures they seem quite likely to be made up by increased power projects and extensions of public utility facilities.

Recovery in Residential Building Expected

"In 1929, total residential building expenditures declined about 28% from 1928, whereas non-residential building increased, and civil engineering work declined only slightly. Consequently, last year's decline in total construction was practically in its entirety due to decline in residential building work. Since this decline went a long way toward correcting the over-supply, demand for residential work is rather better this year than it was a year ago. Recovery in this class of activity may be expected this year with considerable confidence; though it does not seem likely that we shall get back in 1930 to the record-breaking residential activity that prevailed in the 1925-1928 expansion period.

Cities Overdeveloped

"The big building expansion of recent years has consisted largely in the development and expansion of our big cities. As a consequence, the decline of last year was most serious in the largest cities. Construction expenditures in the country as a whole decreased 13% from 1928. In the 12 cities east of the Rocky Mountains with populations of 500,000 or more, last year's decline was 24%, with only two cities out of the 12 showing increases; the 62 cities of more than 100,000 and less than 400,000 population had a general decrease of 12% (about the average for the country); 20 of these medium-sized cities had increased over 1928. Construction expenditures in all communities of less than 100,000 population decreased only 5% last year. While last year's construction decline was largely financial in its origin, it did represent to a considerable degree a reaction from over-development of cities and a correction of over-supply of residential buildings.

Tendency Towards Larger Structures

"Small-house construction reached its peak in 1925 and has been declining somewhat each year since that time. It has not kept up with apartment house construction in recent years. Since 1925 there has been a growing trend toward larger and larger buildings of every class. In the cities, increasing land values tend more and more to make the small building and the moderate size building uneconomic. We see taller and taller office buildings and bigger and bigger apartment buildings. Real estate developments and building projects on an ever increasing scale. It looks as if this tendency is due to an increase from year to year.

Modernization Movement Progressing

"In the field of residential building there is a peculiar problem. The American people keenly desire better houses and apartments, with all that is best in modern design, materials and conveniences. But the cost of new buildings is too great for more than a small proportion of this nation-wide desire to express itself in effective demand for new buildings. Modern buildings can only be sold or rented in large numbers at the expense of rendering existing buildings obsolete. It is rather likely that the obsolescence factor in residential building is increasing, but we have not yet arrived at ways of disposing of old buildings as simply as we junk old cars. At the present time an organized movement for modernization of old buildings, particularly houses, is under way. Its progress was doubtless impeded somewhat in 1929 by generally unfavorable conditions. Apparently there is an excellent opportunity for this kind of work to go ahead at an accelerated pace in 1930; estimates of the probable volume of this class of work for this year have run as high as a billion dollars. This is the present method by which the obsolescence problem in residential buildings is being met, and it seems good economic procedure. But the question arises as to whether in the long run we shall not have to invent radically new residential building designs, with simpler and more economical uses of materials, in order to produce housing for a larger market at lower costs. This, however, looks to a future more distant than 1930.

Planning Must Be on a Larger Scale

"These various modern problems and new tendencies in the growth of our cities have taught us one important lesson. More and more we are beginning to realize that our planning must be on a bigger scale, that we have got to anticipate future requirements

more adequately and to make our building programs more efficiently. We are seeing a much closer understanding between architects, general contractors, real estate men, town-planning commissions and property-owners. These groups are beginning to see that they are responsible for guiding the growth of our communities, and with inventing these new types of buildings that shall best meet the requirements of this new age, and they are realizing that the best they can give to their communities by pooling their knowledge and their capacity is none too good for the people they serve.

"This country's material wealth is unimpaired; its population is increasing, its productive capacity and industrial efficiency are unparalleled in the world's economic history; its financial resources and its creative energy are greater than ever before. The only reasonable program a sensible man can look forward to is a program of growth and expansion. Now, as always, resumption of business and industrial expansion presupposes that building and engineering activity will increase first of all. When construction comes back into full swing, general business will come back. Last year's setback was only an interruption of this country's program of growth.

"Last year we overlooked the need for keeping our construction industry employed; we limited our time and money that should have been spent in building for the country's future into a get-rich-quick scheme of betting on the country's future in the stock market.

Forget the Stock Market—Construct Future Prosperity

"Now that we have sobered up, we realize that we must get to work and construct future prosperity if we mean to have it. Construction which was shoved into the background last year is now back in its rightful place as the central factor in the country's growth and expansion. The only question we can have in our mind this year is: How soon will we see a real upturn in construction activity? How soon will the country resume its program of upward growth? I have pointed out to you some of the straws that show the direction of the wind, some of the little clouds no bigger than a man's hand that indicate a change in the weather. We can look forward with confidence to improvement this year. If it becomes marked in the next couple of months, we can expect a sizeable increase in total construction expenditures over 1929. It would not do to expect a record-breaking year, but we can expect a year of getting back to work, of resumption of the country's economic growth and of preparation for even better years to follow."

Sales and Distribution

Under the general subject of sales and distribution, most of the papers in discussion related to proposed standardization of sand and gravel sizes.

Simplification and Standardization

R. L. Lockwood (of the division of simplified practice, U. S. Department of Commerce) outlined in a general way what had been accomplished in various industries in the way of simplification and standardization, and suggested the use of this division of the government in helping to establish standard sizes for sand and gravel.

F. H. Jackson (engineer of tests, U. S. Bureau of Public Roads) took a stand somewhat against national standardization. His paper is printed practically in full as follows:

Need for Simplification of Sizes in Sand and Gravel Industry

By F. H. JACKSON
U. S. Bureau of Public Roads

TO the mind of the writer the distinction between "standardization" and "simplification" made by R. L. Lockwood, of the Department of Commerce, in his paper on "Simplified Practice in Industry" before this convention, furnishes a clue to the solution of that long standing and ever vexing problem of too many aggregate sizes. For many years we have been talking in a more or less general way about "standardization" of specifications for aggregates and have even gone so far as to propose a series of so-called standard sizes which were adopted as tentative a number of years ago by the American Society for Testing Materials. The writer is becoming more and more convinced as time goes on that our efforts in this direction have been largely misdirected, due to the fact that we have been endeavoring to establish definite specifications for a single series of standard sizes for materials which, as they occur in nature, differ widely in size and in grading. There would appear also to be no real engineering reason why absolute standardization should be effected throughout the United States. The producer of gravel in the Detroit region is not interested in specifications drawn by the cities of Boston or San Francisco. He is, however, vitally interested not only in the specifications which may be drawn by the city of Detroit, but also in those which may be prepared by all other users of gravel in the territory which he serves. Furthermore, the multiplicity of sizes which may be required by users within his territory is just as confusing and works just as great a hardship upon him as any similar situation in the larger national field.

Reduction Needed in Number of Sizes Demanded in Major Centers

As the writer sees it, the outstanding need in the way of simplification of sizes of aggregates is the reduction of the number of different sizes demanded of the producer in each of the major centers of production and distribution. The producer of sand and gravel, while a manufacturer in a certain sense, is not a manufacturer in the same sense as the producer of, say, paving brick. In the production of paving brick the size to be manufactured is directly under the control of the manufacturer and is influenced by considerations entirely apart from the character of the raw material. So it is with most manufactured products. With sand and gravel, however, the producer is faced with the necessity of utilizing to the best advantage the material which nature has furnished and the sizes and gradings of the finished products which he can economically supply are influenced in a marked degree by the size and grading of the pit-run material. He can not supply material with a 2-in. maximum size when the largest size gravel in his pit is 1-in. Neither can be supply economically an aggregate complying with a specification which calls for a preponderance of the larger sizes when to do so would mean the wasting of large quantities of the smaller sizes. Specifications for sand and gravel in any given region are of necessity dependent upon the character of the materials available in that region, which of course means that specifications for materials for the same use in different sections of the country may and probably should be quite different.

Too many specifications are written in rule of thumb fashion without any regard to the most economical use of the available material. Beginners are slow to recognize that the exact limiting sizes or exact range in sizes for a given product are not nearly so important as the question of uniformity of successive shipments of the particular size and grading specified. This is particularly true where the aggregate is to be used in designed mixes of portland cement concrete as opposed to the method of designating arbitrary proportions. The engineer should be able to design a mixture of the required quality regardless of the exact grading of the aggregate furnished. He should, however, have assurance that the *same* size and grading from which he established his design can and will be furnished daily on the job from start to finish.

Uniformity of Greatest Importance

The same is true of other uses of sand and gravel. Uniformity is far more important than mere adherence to some arbitrary size limit, and simplification by reduction of the number of sizes required within a given territory will unquestionably facilitate compliance with requirements for uniformity. In this respect simplification is a distinct advantage to the consumer, because the pro-

ducer, having to manufacture and stock only a few distinct grades instead of many grades differing only slightly in size, is in a much better position to make uniform and mutually satisfactory deliveries on any given project. Our experience has been that the aggregate producer is willing and anxious to comply with the specifications, and it is obvious that his task will be greatly simplified if he has only one instead of a dozen specifications to meet for a given use.

On the other hand, we must bear in mind that the engineer who uses the material is the man who is going to be held responsible for the quality of construction rather than the producer, and he must be convinced that the size which he will be required to use under a simplification program will be just as satisfactory as the sizes which he has been using. Simplification should be a matter of joint effort between producer and consumer.

National Standardization Unnecessary

The above comments have been made by way of emphasizing the writer's opinion that national standardization of specifications for sand and gravel is neither necessary nor desirable. However, this does not mean that simplification by reduction of the unnecessarily large number of sizes now specified in the various production regions should not be undertaken. Nor does it mean that a series of nominal size limits covering the major uses of sand and gravel, such as has been recommended by the Committee on Standard Specifications of your association, should not be adopted. These being merely nominal maximum and minimum size limits would in no sense be considered as specifications but would be subject to further definition by the insertion of suitable intermediate size requirements, tolerances, etc., to meet local conditions.

Joint Efforts Should Get Results

The use of each of the suggested size limits as a frame upon which to hang the simplified specification requirements which may be best suited for that size in each production district is the first step in the simplification program. The adoption of actual specification limits would of course be a matter of joint action by producer and consumer in each case, and this would have to be accomplished before any real benefits from simplification would accrue to either producer or consumer. In a paper presented by L. E. Williams before the 1929 meeting of the American Concrete Institute, efforts being made along this line by a Detroit regional conference are described and illustrate the type of joint effort which should accomplish results. It is understood that similar efforts are being made in the Pittsburgh and other districts.

Recommended Commercial Sizes

The writer would like the privilege of commenting upon the recommendations made by your standard committee relative to the limiting sizes for standard grades of sand and gravel. It is understood that two grades of sand and five grades of gravel have been recommended, as follows:

RECOMMENDATIONS FOR COMMERCIAL SIZES OF SAND AND GRAVEL

Commercial Sizes		
Square Sieves	Round Screens	Typical Uses
		Sand:
0–No. 8	.....	Sheet asphalt, bituminous concrete, plaster, mortar, grout, etc.
0–⅜ in.	0– $\frac{7}{16}$ in.	Concrete, etc.
		Gravel:
No. 4 ½ in.	¼– ⅝ in.	Thin concrete sections, concrete building units, bituminous surface treatment, etc.
¼ in.	¼– ⅞ in.	Light reinforced concrete construction, maintenance gravel roads, etc.
1 in.	¼–1¼-in.	General use as concrete aggregate.
1½ in.	¼–2-in.	Concrete highway construction and general concrete work.
2 in.	¼–2½ in.	Concrete highway construction and heavy reinforced concrete work.

It will be noted that the various size limits have been given in terms of both square mesh sieves and round hole screens. Unfortunately, reference to both types is necessary, due to the inability of engineers to agree on a single standard method of measuring size of coarse aggregates.

Primary Sizes and Combinations

It appears to the writer that the ⅜-in. maximum size for concrete sand is somewhat high and that it is also out of line with the minimum size of gravel, which is given in all cases as No. 4. The ⅜-in. square mesh sieve has a round hole equivalent to about $\frac{7}{16}$ in. or almost ½ in., which is larger than the usual limit for concrete sand. The other comment is in regard to the method of designating all material from No. 4 to the maximum size, say 2-in., as a single size. It is recognized, of course, that in many plants the gravel is not screened into several primary sizes; while in others, notably in many of the larger plants, this practice is followed. The writer would like to see the other method of size designation used; that is, each primary separation being considered as a primary size and combinations of them as combination sizes. In other words, the primary gravel sizes would then be:

No. 4 to ½-in.
½-in. to ¾-in.
¾-in. to 1-in.
1-in. to 1½-in.
1½-in. to 2-in.

This would not mean, of course, that every gravel producer would have to screen his product into these five separate products. A specification could still read, for instance, No. 4 to 1½-in., with suitable intermediate requirements, tolerances, etc. Such a specification would simply mean that the specified material includes four of the primary sizes. Whether it is made up of the four sizes previously screened and then blended to conform to the specification, or whether only two sizes have been originally made, say, No. 4 to ¾-in. and ¾-in. to 1½-in., is a matter of local control. It might even be produced without any separations whatever between the upper and lower limits, provided it were possible to do so, and still meet the specifications.

Advantages of Primary Separations

Designating the primary separations in the manner indicated above, however, has one obvious advantage. It makes possible, under favorable circumstances, the shipping of gravel to the job in two or more separated sizes. In such a case, the engineer specifies the number of tons of each size desired separately, and the producer ships accordingly. The writer believes that the time is not far distant when engineers in charge of important projects will realize the advantages in the way of increased uniformity to be gained by batching the coarse aggregate in more than one size. It is practically a physical impossibility to handle a shipment of coarse aggregate in which the sizes range from No. 4 to, say, 1½-in. square mesh without segregation, and segregation means non-uniformity of product. It is confidently believed that eventually we shall discard the present unscientific and haphazard method of handling coarse aggregate in favor of a method which will insure that every batch of concrete will be like every other batch. In the writer's opinion, nothing will contribute more to this end than the adoption of this practice of handling aggregates.

Producers' Problems Would Be Increased Unnecessarily

Let us look into the matter a little from the producer's standpoint. What change in present manufacturing and distributing practice would be involved? In the first place, how many important gravel plants handle material running up to, say, 2-in. in size which do not make at least one intermediate separation at either ¾-in. or 1-in.? As a matter of fact, is it not probable that in the large producing centers the demand for most if not all of the sizes listed by the committee is sufficient to require the installation of screens for each maximum size specified? However, in many plants, instead of separating the product into a number of primary sizes and then recombining them, gravel of any desired minimum size is obtained by simply screening out the oversize, which is either crushed or washed as local conditions dictate.

Most of the large gravel plants have more or less complicated combinations of screens, bins and chutes arranged and added to from time to time in an effort to manufacture graded products to meet definite specification requirements. In some plants these installations become so complicated as to be practically a Chinese puzzle to anyone but the plant superintendent. The unfortunate part of it is that even though these arrangements may be so designed as to blend sizes per-

fectly in the bin or in the car, segregation in handling will frequently undo the work. Why cannot we adopt the rational and simple method of screening the product into the number of primary sizes dictated by the character of the material and the demand and avoid all this trouble?

Radical Changes Would Be Required

It is of course recognized that in order to do this a radical change in construction practice will be required and it will consequently be just as necessary to sell the idea to the engineer as to the producer. Here again we have the possibility of co-operative effort on the part of producer and consumer in putting across a new construction practice which, in the writer's opinion, would make possible the production of much more uniform concrete at very little additional cost.

The matter of separated sizes, however, though related in a general way to the subject under discussion, is not the question of primary interest. Much missionary work will have to be done before there is general acceptance of that idea. The question of immediate concern is how to secure a reduction in the number of sizes of sand and gravel which commercial producers are now required to produce and stock. As has been noted, the matter of securing acceptance of the recommended nominal standard sizes by the industry and the user would appear to be the first step. The Division of Simplified Practice of the Department of Commerce is admirably equipped to co-operate with the industry in carrying forward this part of the program.

However, the mere acceptance of these limiting sizes will not secure relief to the producer who is harassed with a number of specifications differing as to intermediate size requirements, even though the upper and lower limits may be the same. The specifications of the various users for any aggregate for a given purpose must be *the same* in any given production region before the problem is really solved. Regional committees made up of representatives of both the producers and the consumers should be formed for this purpose. In this work the producer should take the initiative. He is, as a rule, better organized than the consumer. His interests in the matter are also more obvious, though perhaps not more real than those of the consumer.

The regions or areas into which this phase of the simplification program would be divided would correspond obviously to the centers of greatest commercial activity, that is, the regions within shipping radius of the large centers of population. We have already noted activity of this sort under way in at least two such areas—Detroit and Pittsburgh. Why can it not be extended to other areas where similar problems have arisen? The National Association, through its representative members in these regions, is the logical organization to initiate the program.

The Bureau of Public Roads is thoroughly in sympathy with the simplification of sizes and varieties of the various manufactured products used in the construction of roads. The recommendations of the Division of Simplified Practice in the matter of grades of asphalt and varieties and sizes of paving brick have been widely followed by both the industries involved and the user, and there is every reason to believe that similar success will attend the efforts which you are about to initiate in the matter of simplification of sizes of sand and gravel.

Low-Cost Roads

C. N. Conner (executive engineer, American Road Builders Association) read a paper which dealt with the use of sand and gravel in low cost road construction, from which extracts follow:

Uses of Sand and Gravel in Low-Cost Road Construction

By C. N. CONNER
Engineer Executive, American Road Builders Association

GRAVEL surfaces are being successfully surface treated and their traffic capacity doubled. They have proved to be of value as a sub-base for pavements and they are still the predominating type of surfacing. The unsurfaced mileage included in state highway systems is not decreasing at an appreciable rate and those in the county systems are increasing. Consequently the importance of developing efficient types of low-cost road surfaces is apparent and urgent. The principal requirement of such roads is that they shall furnish service.

Definition of Low-Cost Road

Just what is a low-cost road? Formerly by some it was considered as a temporary expedient to serve until funds for the construction of high-type pavements became available; by others it was a 9-ft. section of concrete, or sheet asphalt or brick. Both of these ideas are in error, according to those who have carefully studied the facts and who are successfully building and maintaining low-cost roads. The true low-cost surface is one which is placed upon a graded roadway of such width as will take care of the traffic for years to come with but little additional expenditure of funds other than for increasing the carrying capacity of the road itself.

The Economic Selection of Type

The transportation system of each state as a whole must be studied so a true determination and selection of type can then be made. If the traffic be relatively light in volume or in weight, then the economy of a low-cost road is evident. This low-cost surface should be such that gradual improvement of the surface can be made as the traffic may increase. This is known as progressive or stage construction, and gravel surfaces are well adapted to this method.

During the past three years there has been a tremendous impetus given to this character of construction. It has been realized that to provide immediate and satisfactory transportation facilities to the traveling public insufficient funds are at hand to construct all the needed roads with the old orthodox types such as brick, concrete, asphalt and penetration macadam; engineers and highway officials have, therefore, been casting about to determine ways and means of constructing a satisfactory wearing surface at a lower cost. The test of a low-cost surface is met when the annual maintenance cost is less than the difference between the fixed charges on such a surface and that of a high type.

Suitability of Gravel for Low-Cost Roads

Materials which are suitable, as proved by usage, for low-cost surfaces include a long list; among them are gravel, stone, slag, sand-clay, chert, shale, disintegrated granite, limerock, marl, caliche, shell, cinders, mine tailings and several others. Gravel predominated in all cases when it is available.

There are two general classes of gravel; one which contains a natural binder such as clay and the other which is "clean" and contains little or no cohesive binder. Both are successfully used for surfacing. It is noticeable that the gravel surfaces containing binders become pot-holed under traffic, while those containing little or no cohesive binder and a relatively high percentage of sand become corrugated.

Improving Gravel Roads

Improved construction and maintenance methods and a more careful selection of the gravel itself are also making gravel roads more serviceable than ever before. Among the many improvements which make for better gravel roads the following are selected.

1. Use a wide surface 18 ft. in width and preferably more.
2. Use relatively low crowns of from ¼ to ⅜ in. per ft.
3. Gravels which are difficult to bind under rolling or traffic have been stabilized under traffic by the addition of non-slaking binders such as slag, limestone, screening and volcanic cinders.
4. Gravels containing a relatively high percentage of sand or laid on sandy subgrades do not compact readily and become corrugated under traffic. They need a cohesive binder in the mixture.
5. Angular aggregates are preferred because they become locked in place under compaction and are less easily displaced because of their increased friction. Crushed gravel gives better service than round gravel.
6. The maximum size for gravel in many specifications does not exceed 1-in. and there is a marked tendency toward ¾-in. as the maximum. This is because of easier manipulation and maintenance with the smaller sizes, smoother riding qualities and a more densely compacted surface.

7. Clay gravel surfaces which become pot-holed by traffic may be improved by adding fine clean gravel for the top wearing course.

8. Nearly all untreated gravel surfaces are dusty. Calcium chloride has been found effective for reducing dust and loss of surfacing material.

9. Bituminous surface treatments of gravel roads have passed the purely experimental stage and are in the period of practical usage. There are two principal methods of treating with tars and asphalts, one by the surface application method and the other by the mixed-in-place method. Both are excellent, but the mixed method is gaining in popularity. Information is available for the proper selection and application of each.

10. The treatment with bitumens of uncompacted gravels, or those gravels which are unsuitable for treatment because of the character of the binder or aggregate which they contain, has resulted in some failures. Such failures can be greatly reduced in numbers because many of these surfaces if well compacted may be used as base courses for a covering of selected crushed gravel mixed with bitumen.

Unfortunately, existing knowledge of ways and means for improving gravel roads is not sufficiently utilized and there is too great a lag between the establishing of facts and their utilization. The possibilities for increased business in your industry are here and now as shown by the increasing mileage of excellent low-cost gravel roads in many states, in the majority of counties and on some federal highways. Low-cost roads are becoming popular, researches are continuously seeking their improvement and, above all, these roads are a solution to the transportation problem of the strictly rural communities.

Report of Committee on Standard Specifications

Stephen Stepanian, reporting as chairman of the committee on standard specifications of the association, reviewed the committee's activities during the past year, stating that the committee had been divided into four sub-committees as follows: (1) Advisory, (2) commercial sizes and grading of commercial sizes, (3) deleterious substances and characteristics other than concrete, and (4) past methods.

All the sub-committees have been active and reported in time for this convention.

Extracts of the committee reports follow:

"The report of Sub-Committee II reaffirmed the proposed commercial sizes, suggested recommended sieve sizes for testing sand and gravel, and proposed tentative specifications for grading for the following uses or sizes: (1) Sand for sheet asphalt and bituminous concrete, (2) sand for inside plaster, (3) sand for cement grout filler, (4) sand for concrete, (5) sand for cement mortar bed or cushion, and (6) gravel for the six different proposed commercial sizes.

Wide Grading Ranges

"In preparing the specifications for grading, the committee recognized the difficulty in stating requirements which could be expected to be generally applicable. Proper specifications, it was felt, should be predicated principally on the idea of securing the use of materials of a high degree of uniformity. The chief difficulty encountered in formulating specifications of a general nature lay in the comparatively wide range in grading of materials encountered in different localities. A specification containing limitations sufficiently wide to permit the most economical use of proper materials in different localities seemed inconsistent with the desire to encourage the use of sand and gravel of a proper degree of uniformity. However, it was felt that recommendations could be prepared which would furnish a guide and the committee formulated the recommendations of extreme limits within which it was felt that sand and gravel, satisfactory for the usual purposes, should fall. In no sense were they considered to represent the committee's conception of ideal gradings. It was the thought of the committee that specifications with narrower limitations and falling within the recommended over-all limits should be prepared in each locality to meet the needs of local conditions and to insure a product of proper uniformity.

Proposed Grading Specifications Differ

"Except in the case of inside plaster, the proposed specifications for grading of sand for the different uses listed above conformed, in all essential features, to specifications proposed by such organizations as the American Society for Testing Materials. The proposed specifications for grading of the various sizes of gravel differed from the usual form in that they recommended definite percentages passing only the limiting sizes and, for the intermediate sizes, recommended only a *maximum range* in percentages passing. These recommendations, in effect, followed the proposal included in the report before the 1927 convention, except that the recommended range in percentages passing the intermediate sizes was changed from 25 to 35.

"Sub-Committee IV reported that they had reviewed all test methods for sand and gravel which had been published by national organizations. It was not prepared to make any definite recommendations with reference to changes at that time, but it was felt that further consideration would lead to recommendations which it would be desirable to pass on to the organizations originating the test method.

"During 1929 the viewpoint of the committee on its work was changed somewhat by a proposal for co-operation with the Division of Simplified Practice of the Department of Commerce in carrying out a program to reduce the number of commercial sizes of sand and gravel. This proposal impressed the committee as being in direct accord with the ultimate aim of its activities. It was felt that the facilities afforded by the Division of Simplified Practice offered the best, if not the only, method of enlisting the co-operation of users of sand and gravel as well as producers.

Range of Sizes Should Be Selected to Cover Common Uses

"The fact that sand and gravel is a local product with a comparatively short shipping radius made the problem in our own industry, it seemed to us, somewhat different from that encountered in others which had undertaken simplification programs. It was felt that a survey to determine what different sizes are manufactured would yield little information not already available and that it would be impracticable to obtain accurate information concerning demands for the different sizes. It was decided by the committee, and Mr. Lockwood concurred in this decision, that most satisfactory results would be obtained from the committee selecting a range of sizes which would cover the common uses of sand and gravel and to submit these sizes to the industry for their consideration.

Recommendations

"The recommendations of the committee for sizes of gravel are presented for consideration of members of the association at this time and are given in Table 1 attached to this report. With respect to them, the committee recommends the following:

"1. That these recommended sizes be circulated with a ballot to members of the association for their approval or comment.

"2. That when an agreement of members of the association representing 80% of the production within the association has been received, these recommended sizes or such sizes as may have been arrived at in effecting the agreement be circulated to all producers of sand and gravel.

"3. That when an agreement of companies representing 80% of the production of sand and gravel is obtained, that the resulting recommendations be presented to the Division of Simplified Practice with the request that they call a conference of producers, distributors and users of sand and gravel to act upon them.

"In addition to the proposal for commercial sizes discussed above, the committee reported its recommendations for sieze sizes,

specifications for grading of sand for inside plaster and specifications for grading of the various proposed commercial sizes of gravel. These are given in Tables 2, 3 and 4."

TABLE I. RECOMMENDATIONS FOR COMMERCIAL SIZES OF GRAVEL

Material with not more than 5% coarser than the maximum size or 10% finer than the minimum size shall be considered as conforming to these requirements. In case of a dispute sieves with square openings shall govern.

Square sieves	Approximate equivalent round screens, inches
No. 4— ½ in.	¼– ⅝
No. 4— ¾ in.	¼– ⅞
No. 4—1 in.	¼– 1¼
No. 4—1½ in.	¼– 1¾
No. 4—2 in.	¼– 2⅜
No. 4—2½ in.	¼–30

TABLE II. TENTATIVE SPECIFICATIONS FOR GRADING OF GRAVEL

Limitations on the intermediate size should be selected to meet the needs of local conditions. **A range of not more than 35% shall be permitted.**

Range in size	Intermediate screen size, in.	Percent passing—Maximum size	Percent passing—Minimum size
No. 4— ½ in.	....	95 to 100	0 to 10
No. 4— ¾ in.	....	95 to 100	0 to 10
No. 4—1 in.	½	95 to 100	0 to 10
No. 4—1½ in.	¾	95 to 100	0 to 10
No. 4—2 in.	1	95 to 100	0 to 10
No. 4—2½ in.	1	95 to 100	0 to 10

TABLE III. TENTATIVE SPECIFICATIONS FOR GRADING OF SAND FOR INSIDE PLASTER

Passing		Per cent
8 mesh sieve	not less than	90
30 mesh sieve	not less than	20
	not more than	85
50 mesh sieve	not less than	5
	not more than	30
100 mesh sieve	not more than	5
Weight removed by decantation, not more than		5

TABLE IV. SIEVES FOR TESTING SAND AND GRAVEL

Sieves of No. 4 mesh and finer conform to "Standard Specifications for Sieves for Testing Purposes" of the American Society for Testing Materials.

Sieve size or number	Width of square opening, in.	Size sieve or number	Width of square opening, in.
200*	0.0029*	8	0.0937
100	0.0059	4	0.187
80*	0.0070*	⅜ in.	0.375
50	0.0117	½ in.	0.5
40*	0.0165*	¾ in.	0.75
30	0.0232	1 in.	1.0
16	0.0469	1½ in.	1.5
10*	0.0787*	2 in.	2.5

*For use in connection with Asphalt Sand specification.

Discussion of Standardization

R. V. Warren (engineer, Western Pennsylvania Sand and Gravel Association), discussing R. L. Lockwood's and F. H. Jackson's papers, said in part:

"Emphasis should be placed upon this phase in Mr. Lockwood's paper—'reduction in variety of quality.' As it applies to the sand and gravel industry, it means that the practice of furnishing good quality of sand and gravel on some occasions and poor quality on others must cease with the adoption of simplified practice. Good quality and poor quality materials mean two different varieties of quality. Clean materials and dirty materials are also two different varieties of quality. Reduction in variety of quality in the sand and gravel industry chiefly means discontinuance of the practice of furnishing clean materials one day and dirty materials the next—it means clean sand and gravel every day.

"Mr. Jackson has stated, 'Efforts to standardize on a single series of standard sizes nationally are misdirected' and 'National standardization of sizes is neither necessary nor desirable.' He also touches upon the matter of quality by stating, 'Uniformity of product is more important than adherence to some arbitrary size.' In addition, he suggests a way of classifying sizes by making each primary separation a primary size.

Specification Writers Greatest Obstruction of Standardization

"Both authors are of the opinion that simplified practice is feasible in the sand and gravel industry, and that there is an outstanding need for the reduction in the number of sizes. However, simplification or reduction in the number of sizes in their judgment is a matter to be handled locally in the large centers of production. Jointly they point out the obstructions that are in the pathway of simplification of sizes. Nationally, there is the geographic barrier. Materials on one side of this barrier are not identical with those on the other. The fragments of gravel on one side may not exceed 2 in., while on the other there might be a preponderance of 3-in. fragments. Locally, the largest obstruction is the engineers' creative pride—the desire to write into specifications their personal ideas on what makes the best construction.

Lack of Harmony Between Designing Engineers

"The writer just recently became interested in the sand and gravel industry and is not thoroughly familiar with many of your problems. However, from my experience so far I must agree with the findings of Messrs. Lockwood and Jackson. One of the first things that came to the writer's attention since joining your industry was the lack of harmony between engineers in the same region when it comes to specifying the sizes of sand and gravel for construction work. During the past construction season our Pittsburgh producers have had many barges of gravel rejected by city employes because of size, and this rejected material was accepted the next day by state employes. The gravel was to be used by both branches of government for the same purpose and in the same part of the highway structure. Size was the only question at issue. Because of varied specified sizes, what was acceptable to one was objectionable to the other. This is the local obstruction—the engineer's creative pride.

Over 51 Sizes Demanded in Pittsburgh Area

"This variation in specified sizes prompted the writer to learn how many different sizes were specified locally. Examining but 11 specifications which control only a small part of the work performed in the tri-state territory served by the Pittsburgh sand and gravel producers, the writer found 51 sizes or what also may be termed gradations. The specifications examined included: the highway and bridge specifications of three states —Ohio, Pennsylvania and West Virginia; of three counties; of one city, Pittsburgh; and of one borough; the specifications for plain and reinforced concrete structures of two railroad corporations, and a specification of the United States government. The last mentioned specification was not for a specific construction project, but merely for the gravel to be used in general work by the government on the Monongahela river.

"On analyzing these 51 gradations, it was found that, altogether, there were 29 different gradations specified for the gravel used as a coarse aggregate in concrete structures, and 28 gradations used elsewhere than in concrete. Separating the coarse aggregate gradations into the commercial sizes—small, medium, and large; it was found that there were 7 different gradations specified for the small size aggregate, 9 for the medium, 9 for the large, and 4 intermediate sizes. The last mentioned sizes were taken from specifications that require 5 different and distinct gravel gradations for the various concrete structures. Further analysis showed 6 different gradations of the large size aggregate specified for the concrete used in the highway base course. The maximum fragment size ranges in these 6 from particles that will pass a two-inch screen to particles that will pass a three-inch sieve, and similar variations occur in all of the gradations. The maximum percentages of intermediate sized pieces in some specifications is the minimum percentage in others.

Zone Standardization Needed

"These conditions in the Pittsburgh area or region are cited to show that what the industry needs is technical standardization in zones. To accomplish this, the producers' representatives must impress upon the local construction engineers the difference between nature's product and manufactured articles. While man can mould steel into almost any size, it is hard for man to put something into nature's storehouse it does not contain. If the sand and gravel deposit does not contain over two-inch particles, it is hard for the producer to include in his delivery three-inch particles.

"The Pittsburgh producers have simplified their practices to the extent that each is producing the same commercial sizes. Now, they are striving to carry simplified practice to its full meaning by making reductions in the variety of quality, and to bring about reduction in the multiplicity of sizes, they are trying to establish locally technical standardization. The Pittsburgh producers' objectives include simplification and standardization."

Daniel Hubbard (division engineer, Chesapeake and Ohio railroad) read a

paper on "Gravel Ballast for Railroad Purposes," extracts of which follow:

Gravel Ballast for Railroad Purposes

By DANIEL HUBBARD
Division Engineer, Chesapeake and Ohio Railway Co.

IN THE manual of the American Railway Engineering Association gravel ballast is subdivided into three headings, i.e., washed gravel, screened gravel and pit run gravel. It has been proposed by the ballast committee of the American Railway Engineering Association to reduce this to only two sub-headings, namely, prepared gravel and pit run gravel, which we felt would be much more appropriate and which would simplify the explanation of gravel's use for railroad purposes. Prepared gravel will be any gravel which is crushed, washed or screened to meet A.R.E.A. specifications for such ballast. Pit run ballast will be that ballast which comes direct from the pit without any further preparation.

Washed Gravel Ballast for Heavy Traffic Conditions

I wish to quote a few instances of the use of gravel under track which supports exceptionally heavy tonnage. A short time ago there was turned over to me a line which had been ballasted entirely with pit run gravel. This aggregate was from 12 in. to 4 ft. in depth on a double track railroad, 63 miles long and which had been completed in a comparatively short time. The heavy traffic was west bound. A short time after taking over this stretch of track for maintenance, pumping joints and pumping track developed on the west bound track, while the east bound still held up in good condition. After a study of local conditions it was decided to reballast the entire west bound track with prepared gravel with an average of 3-in. lift. Before the application of the prepared gravel the pit run was in some instances put under with a light raise, and where roadbed conditions warranted was cast aside and used as roadbed material.

After this application, in one season of 63 miles of prepared gravel ballast, the pumping joints and track almost entirely disappeared. The east bound, 63 miles, which carried the light traffic, we were able to hold for another year on pit run gravel with very light renewals, with the exception of such replacements as were necessary on the new fills which were settling. In view of the success that we had on the west bound it was later decided to give the east bound track the same treatment as previously given the west bound.

Use of Washed Material Reduces Maintenance Costs

The results have been more than satisfactory. Pumping joints on both tracks have practically disappeared, due to the fact that the second lift had been made on good clean gravel ballast. It is not to be considered that this 3-in. raise is going to hold up, under the heavy traffic carried, indefinitely; and with the view of obtaining better riding track and less maintenance labor cost it has now been decided to give both tracks a further lift on prepared gravel. This means a very heavy maintenance budget for the mileage involved for the ensuing year, but the results obtained, I am sure, will more than compensate for this cost, and in the end will result in a reduced maintenance expenditure.

Sand Can Be Used for Raising Tracks to Grade

In connection with the use of by-products from gravel pits, I would like to call your attention to the possible use of sand, especially in localities where this product is not easily assimilated by the highway construction program. For railroad purposes, especially in connection with subdivision of grades, where, as a general rule, tracks are raised and highways are lowered, this material has been very extensively and successfully used for raising main line tracks anywhere from 3 to 20 ft. In a great measure its success has been due to the fact that on fills where track is raised on sand, there is very little shrinkage. In other words, a track raised to grade stakes on sand will stay where it is put.

I do not know of very many railroads which have adopted this mode of procedure, but the thought occurs to me that it is one well worthy of consideration by all gravel ballast people whose excessive sand is not easily disposed of. I know from personal observation that it has been a very decided success on one railroad, the use of which resulted in a very material saving on construction cost, where tracks were raised in elimination of grade crossings. One of the most important features in connection with this class of work is the non-obstruction of traffic and cheapness of the material available. A great many of you, no doubt, have a very serious proposition on your hands as to how to obtain a profitable market for such a by-product, and if this method of obtaining successful results was used on one railroad certainly it could be applied to practically every railroad in the country within a reasonable distance of ballast pits, where work of this kind is contemplated and the material is available.

Economic Factors Favor Use of Prepared Ballast

I had expected at this meeting to give you some comparative data as between the cost of maintenance, under heavy traffic conditions, of gravel and stone ballast. I regret to say that this study has not yet been completed, and therefore the figures at present would not be of much value. Suffice to say that on 123 miles of double track, under exceedingly heavy traffic and high speed passenger traffic, it has been decided in the last few years to go entirely to prepared gravel ballast, which so far has proved beneficial beyond expectations. The maintenance cost has been reduced and the track riding performance greatly increased, and these factors have been obtained at a very much less capital and maintenance cost.

Furnish Material Up to Specifications

In conclusion, may I offer a word of advice to the superintendents of the local prepared gravel plants: Do not depend upon the railroad inspector to see that every car of ballast that leaves your plant is up to railroad or A.R.E.A. specifications. Either yourself or someone whom you can entirely depend upon should examine these cars closely, bearing in mind the fact that a few cars of poor prepared gravel can offset hundreds and even thousands of cars of up to specification ballast. An executive or railroad officer who rides over the road does not give a great deal of thought to the many miles of excellent tracks put up with A-1 gravel ballast, but his attention is quickly called to a few spots which may show that a few cars of ballast, which were not up to specification, have been unloaded. It would be far better for the superintendent or those who are in responsible charge of the quarry works to say to the supervisor, roadmaster or division engineer as follows: "These cars are not up to standard. I want you to unload them in some yard or commercial track where they will not be subjected to heavy traffic and we will not send you any invoice." This, in the long run, will more than pay for the few cars unloaded without charge.

The present status of the gravel industry, with special reference to railroad work, has not taken place overnight, but is the result of tireless efforts on the part of the combined gravel companies of the United States and Canada, and from the results which have been obtained from a maintenance viewpoint of many railroads. If the producer is not interested or does not take an active part in the discussions at such a convention as yours the gravel industry as a whole must necessarily suffer.

Effect of Coarse Aggregates on Quality of Concrete

Stanton Walker (director, Engineering and Research Division) in a paper on the "Effect of Coarse Aggregates on the Quality of Concrete" said: "Aggregate characteristics should not be confused with arbitrary aggregate types such as gravel, crushed stone, or blast furnace slag. Most of the significant characteristics are common to the different types. Definite information of a fundamental nature will be obtained only from a study of each characteristic without reference to arbitrary classifications.

"All characteristics of coarse aggregates are not independently significant in con-

trolling the quality of the concrete. Those properties which are commonly listed in specifications and others which are generally considered to be of importance are:

Properties Controlling Concrete Quality

"1. *Soundness and Durability*—Aggregate particles which are unsound and disintegrate under the conditions in which they are exposed in the concrete may cause disruption and failure of the structure.

"2. *Hardness and Strength of Aggregate Particles*—It is important that the particles be able to withstand the stresses transmitted to them by the mortar.

"3. *Surface Texture*—The bond between the mortar and the aggregate particles may be influenced by surface texture.

"4. *Shape of Particle*—The void content of the coarse aggregate and, consequently, the amount of mortar required to produce workability are affected by the shape of the particle.

"5. *Miscellaneous Deleterious Substances*—Injurious amounts of deleterious substances cause harm to concrete in a variety of ways—organic matter affects the hardening of the cement, coatings affect the bond, dust requires additional water and contributes to planes of weakness, etc.

"6. *Size and Grading*—The economy, strength, density, workability and other properties of concrete are affected to an important extent by the size and grading of the coarse aggregate.

"These factors have been found to have effects which vary in importance for the different properties of concrete. Other characteristics, such as mineral composition, specific gravity, absorption, etc., will come to mind. However, it is believed that the list includes the more important factors which may be expected to have a direct bearing on the quality of the concrete; other factors have, for the most part, an indirect effect which is reflected by those listed."

Ready-Mixed Concrete

Probably the most interesting and instructive discussion of the whole convention was the session on the preparation and sale of ready-mixed concrete. This discussion was led by **Stanton Walker** with a paper which is published practically complete, as follows, supplemented by a paper by **H. F. Thompson** (vice-president, General Material Co., St. Louis), which is abstracted practically in full.

Ready-Mixed Concrete

By STANTON WALKER
Director, Research and Engineering Division, National Sand and Gravel Association

THE production and marketing of ready-mixed concrete has developed into a comparatively large industry within only a few years. While central mixing plants, designed to serve one large job only, were used longer than 15 years ago, the practice of manufacturing concrete for the open market is not more than about five or six years old. Five years ago there were in the neighborhood of 25 plants in the United States engaged in the production and marketing of concrete delivered ready for use; today there are well over 100. The first plants were small and depended upon adaptations of ordinary equipment for the proportioning, mixing and transportation of the concrete. The inadequacy of the equipment limited the flexibility of the plant in furnishing different quantities and qualities of concrete and greatly restricted the radius of operation. Today equipment specially designed for the purpose is available which permits of ready changes in quantities and proportions and makes the radius of operation limited by considerations of economy rather than quality. Where the typical plant of a few years ago would attempt to service only the small jobs, the plant of today is prepared to handle almost any problem of furnishing concrete which may be submitted to it.

Stability of Industry

In spite of the rapid growth of the industry, the question most frequently asked is whether ready-mixed concrete is here to stay. It gives every indication of being as permanent an institution as the concrete industry and existing plants, in general, seem to be showing a fair return on the investment. This does not mean that an unlimited expansion of present facilities is justified. Much is yet to be learned of its technique and economics; it is generally conceded that it should be entered only in the light of thorough knowledge of the problem. The use of ready-mixed concrete has developed so rapidly that no adequate analysis of its possibilities has ever been made; experience must be had before an accurate picture of its future can be drawn.

Ready-Mixed Concrete Needed in Large Cities

One of the best indications that the ready-mixed concrete industry fulfills a definite need is the difficulties encountered in performing the large amount of construction work in congested areas. Under these conditions the logical source of supply is the ready-mixed concrete manufacturer.

The investment in equipment and overhead, which the contractor must make in order to produce his own concrete, offers still further justification for ready-mixed concrete. Idle equipment is expensive and the contractor should welcome the opportunity to turn as much of this burden as possible over to the ready-mixed concrete operator, who, due to the wider scope of his activities, is in a position to cut down idle time to the minimum. Not only the investment in equipment, but labor required for mixing, handling and storing materials, timekeeping, estimating, etc., must be considered. The saving in investment is not immediately apparent on account of available contractor's equipment, but that on hand will wear out in time, and, in addition, it seems logical to predict that much of it now in use will be diverted to places where ready-mixed concrete would not be practicable.

The increasing stringency in requirements for quality of concrete has been cited frequently as a justification for the ready-mixed concrete plant—and it is an excellent one. However, I have cited it last, as I believe that, were there not other reasons based solely on the economics of the situation, developments in control methods applied to job plants would take care of this problem. Nevertheless, the fact remains that the ready-mixed concrete operator is in a much better position to control the quality of concrete than the job operator, although he must take full advantage of his opportunities in this respect if this factor is to be an important argument for the sale of his product.

Tendency Towards Use of Finished Materials

Parallels in other branches of the construction industry indicate the tendency of the contractor to utilize finished materials as much as possible. The growing use of sub-contractors by the general contractor is a trend in that direction. The use of prepared plasters, mixed paints, fabricated reinforcing, special column forms are steps toward standardization and specialization similar in effect to the development of the ready-mixed concrete industry.

The whole question of the permanency of the industry has its answer in accurate studies of the relative economy of centralized production. Unless ready-mixed concrete can justify itself on this basis it is doomed to failure. It is my opinion that it can; there have been few instances where quantity production by specialists has not proven more economical than production by individuals primarily interested in the finished product. It should be emphasized, however, that the chances of adequate return on an investment in the ready-mixed concrete field depend just as strongly upon the exercise of strict business principles as they do in any other business; faulty business methods will invite sure failure.

Field for Ready-Mixed Concrete

So far as quality is concerned, ready-mixed concrete, properly handled, can be adapted to almost any type of concrete construction within trucking radius of a plant. However, its economy in comparison with concrete manufactured on the job will vary with the distance and with the nature of the work.

Up to the present time, ready-mixed concrete has been most popular in work for which the forms are readily accessible and for which a high degree of plasticity is not required. In general, also, most attention has been paid to the smaller jobs on account of the greater ease of servicing and the greater cost to the contractor of providing his own equipment. This has furnished a foundation for the growth of the industry and has given time for the development of methods for handling more complicated work.

The use of ready-mixed concrete for reinforced construction has become common and it has been used in a large volume of such work. This has required special consideration of methods of transportation and distribution over the job. More thought and planning are necessary than for the more accessible construction, but its use offers no problems which are not capable of solution.

Types of Job

The rapid expansion of the scope of the industry depends, to a large extent, on the co-operation which the operator can give the contractor in furnishing concrete when wanted and in sufficient quantity. The type of job which can be accepted, therefore, depends on whether or not means can be worked out to provide adequate service.

Admitting the stability of the ready-mixed concrete industry and the suitability of its product for use in practically all types of construction, there remain important questions to be considered in connection with the establishment of each plant. Is the community large enough, and growing rapidly enough to support a plant, and is the nature of the growth such as to provide a market for ready-mixed concrete? Is a site available which will permit of an economical operation? What capacity of plant and type of equipment will serve the needs of the community most economically? These questions, as well as many others, must be answered and answered accurately, because the ready-mixed concrete operator is going into competition with an established and intelligently run industry.

Size of Community Necessary

No hard and fast rule can be stated for the size of community in which a ready-mixed concrete operation will be profitable. They are being run in towns as small as 15,000 population. Some who have studied the question say that a population of 70,000 is the minimum which will support a profitable business. If any figure is to be named, probably 40,000 to 50,000 should be stated as the minimum and then only where a study has shown favorable conditions. A community that is principally residential in nature, even though it is growing rapidly, offers few possibilities unless there are exceptional circumstances. A relatively small community with rapid industrial growth and with prospects for considerable public improvements may provide excellent opportunities.

Factors Determining Establishment

community is large enough to justify the introduction of ready-mixed concrete will be found from adequate consideration of the following factors:

1. Volume of business required by the operator. For example, a business man can hardly expect to receive a full-time salary for supervising an operation representing an investment of $30,000. On the other hand, if the supervision can be handled by a going organization, the investment of $30,000 in a ready-mixed concrete operation will, under favorable circumstances, make a fair return.

2. Annual consumption of concrete. Knowledge of the consumption of cement and concrete aggregates over a period of years will be of great assistance in studying this factor.

3. Proportion of the concrete-construction done annually which would afford a logical market for ready-mixed concrete. The determination of this factor will be the source of the most difficulty, since it involves complete consideration of such economic factors as location of plant, availability of materials, radius of operation, type of equipment, etc., and their relation to the cost of production. In other words, the cost of ready-mixed concrete in the forms as compared with the cost to the contractor, if he uses his own plant, must be known.

Location of Plant

The success of a ready-mixed concrete operation depends principally on its location. Raw materials for manufacturing the concrete should be readily available. Accessibility to the territory to be covered must be considered from the viewpoint of a central location and traffic conditions; the *time* required for delivery is of more importance than the *distance*. Ample space should be available for storage of materials in order that continuous operation may be assured.

The availability of raw materials is of prime importance. The most favorable condition is found in the use of a part of an existing material yard as the plant site. This eliminates expensive rehandling and provides a constant supply of aggregates; an important feature also is the spare time use of trucks and, sometimes, bins and batchers.

Little can be given in the way of rules for the selection of a site, except to stress its importance. The cost of hauling materials to the ready-mix plant plus the cost of transporting the finished concrete to the job should compare favorably with the cost of hauling the raw materials direct from the source of supply to the job.

Capacity of Plant and Investment

Information on the investment required for different concrete-producing capacities is necessary in considering the desirability of establishing a plant, but conditions are so variable that no estimate which would be generally applicable can be given in this paper. Small plants have been built for as little as $20,000 and large plants have run to $500,000 or more. It seems to be generally agreed that it is necessary for transportation equipment to represent from 50 to 75% of the total investment.

In order that some idea of the relation between investment and capacity may be represented to stimulate discussion, I venture to suggest that ½ cu. yd. per year represents the approximate average capacity which may be obtained from an investment of $1 with the present costs of the most modern equipment, or an investment of about $2 for each cubic yard annual capacity. Even a rough calculation of the cost of delivering a cubic yard of concrete on the job indicates that, for a fair return, the margin of sales price over cost of materials per cubic yard of concrete should be about 25% greater than the investment necessary to produce and deliver this quantity; and that means a gross sales of around four or five times the amount of the invested capital. These figures must not be considered as a proper basis for arriving at definite conclusions; however, they probably may be expected to give some ideas of the correct order of magnitude.

In deciding upon the capacity of a plant it must be kept in mind that probable peak loads as well as average requirements must be taken into consideration. It is the annual production which will decide the profitableness of the investment, but it is the peak load consumption which will dictate, to a large degree, the size of the plant and the investment.

It cannot be emphasized too strongly that accurate costs must be kept if the business is to be a success. These should include consideration of such factors as interest on investment, depreciation, cost of concrete materials, operating expense of plant, hauling costs, overhead and sales. Probably the items most often underestimated are depreciation and hauling costs.

Equipment for Plant

Equipment for ready-mixed concrete operations, particularly transportation equipment, is still very much in the development stage. In general, there are two methods of producing and transporting concrete which are more or less related. These are: (1) Batching plant and central mixer with trucks for transportation of the concrete to the job, and (2) batching plant and truck-mixers in which the concrete is transported to the job and mixed (either in transit or after arrival at the job). Opinion has not crystallized as to the merits of these two methods. Each of them has outstanding advantages which must be taken into consideration and which differ, depending on local conditions.

Batching Plant

Equipment for batching plants has been developed to some degree of standardization and, for that reason, may be passed over briefly. Principal emphasis should be placed on providing means for economical handling of materials and accurate measurement of quantities. Provision should be made for heating materials and the installation of any refinements which will add to the flexibility of the plant.

The most common form of construction provides for overhead bins for all materials which permit of their discharge by gravity into the measuring hoppers. Bins for three or more different sizes of aggregate must be provided if proper flexibility in quality of concrete is to be obtained. It is considered more economical to provide for the use of bulk cement where conditions permit, but sacked cement is often used. In some cases the sacked cement is discharged direct to the mixer and in others it is emptied into a storage bin. In many cases it will also be necessary to make provision for the handling of admixtures. The topic of handling materials at the plant could be developed into a considerable discussion but time does not permit.

Accurate measurement of materials is possible with existing equipment. A number of weighing batchers are on the market. Adjustable volume batchers are available. Volume batchers for measuring sand and compensating for bulking and moisture content have been in use for several years. Cement, unless it is handled direct to the mixer in sacks, must be weighed if sufficient accuracy is to be secured. To enter into a discussion of the relative merits of these different types of measuring devices is outside the scope of this paper. It can be said, however, that weighing devices provide the greatest flexibility where variable quantities and proportions are mixed.

Mixer Capacity

For a central plant sufficient mixer capacity should be provided to take care of peak loads and to load trucks with a minimum of lost time. Other conditions permitting, the capacity of the mixer and the capacity of the truck should be the same. The use of a small mixer in connection with larger-capacity hauling facilities cuts down the efficiency of the latter. The capacity for furnishing concrete is limited by the transportation equipment and the additional investment required in mixer capacity to keep the trucks busy will be comparatively small.

According to one authority, a 1 cu. yd. mixer will handle quantities up to about 150 cu. yd. per day satisfactorily, 1½ cu. yd. mixer up to 250 or 300 cu. yd. and a 3 cu. yd. mixer up to about 500 or 600 cu. yd. Where greater capacities are desired more than one mixer should be installed. Another authority, speaking with reference to the 3-cu. yd. mixer, points to the greater flexibility of smaller units and cites advantages of decreased charging and discharging time, less cumbersome proportioning equipment and less head room. He states that the increased daily capacity of a larger mixer over a small one is not as great as would be expected.

Trucks

Transportation equipment for ready-mixed concrete is in an earlier stage of development than batcher plants and central mixers. However, great strides have been made and the problem seems in a fair way to solution. A truck for transporting concrete which will prevent segregation, eliminate leakage, permit of convenient discharge of the concrete, be comparatively light in weight, and (considered highly important by some) permit of being used for other purposes, is the aim of the industry.

The first ready-mixed concrete was delivered in trucks with ordinary dump bodies. These served fairly satisfactory as long as a high degree of workability in the concrete being delivered was not required. However, they permitted loss of water with consequent reduction in workability and were difficult to discharge. They have been practically eliminated from service and replaced with special designs to eliminate leakage and to facilitate dumping. The truck with the water-tight body and easy dumping facilities serves the purpose admirably so long as segregation can be avoided. Unfortunately, except for quite dry concrete or short hauls, it seems difficult to handle concrete in them without segregation.

The broadening of the field of ready-mixed concrete to include building construction, which requires a relatively high degree of plasticity, caused the development of trucks specially designed to prevent segregation. These are, in general, of three classes: (a) special bodies designed to remix the concrete while dumping, (b) agitators, and (c) truck-mixers. Most activity seems to be directed to the development of the latter two classes, which reduce difficulties due to segregation to a minimum and remove limitations on plasticity.

Selection of Type of Equipment

The relative merits of different combinations of equipment is a much discussed subject. Should a central mixing plant with equipment for transporting the mixed concrete be used or should truck mixers and a batching plant be established? No answer to this question will be attempted. Before the introduction of agitators, the truck mixer had an obvious advantage so far as flexibility is concerned. With their introduction, however, this advantage was eliminated, or at least reduced to a negligible quantity for normal hauls. Perhaps a summary of the limitations of each will be helpful.

The open truck, with no equipment for agitation, is, of course, the most economical form of transportation. It is limited in radius of operation and type of concrete which it can haul. Stiff concrete, with a slump of, say, about 2 in. or less, can be delivered satisfactorily in almost any truck. Plastic concrete will segregate if hauled any considerable distance in trucks and will require remixing before use. An important feature of them, however, is that they can be readily used for other service.

The "agitator" is a truck designed to haul concrete from a central mixer to the job and to agitate it in transit to avoid stiffening and segregation. It will permit of almost any length of haul with concrete of a wide range in consistency. However, some loss in plasticity must be expected on account of evaporation and absorption of water. Some of these may be used to haul other materials, and some permit of removing the bodies and replacing with ordinary ones. There are several different types on the market and adequate descriptions of them will be found in most of the trade papers. All of them seem to be giving satisfactory results as far as quality of concrete is concerned. A discussion of their relative merits would involve much personal opinion, the accuracy of which would depend, to some degree at least, on local conditions.

Truck Mixers

A truck mixer is a portable mixer which requires only a batcher plant to serve it. Concrete of any plasticity can be hauled for any distance, since the water does not need to be added and the mixing action started until the job is neared or reached. They also, in some cases, have been used to haul other materials. The transportation and maintenance costs of a truck mixer are, of course, higher than for the ordinary truck, and, probably, also higher than for the agitator type. Several truck mixers have been developed and others are in the process of development.

Dry Batching Plants

In suburban districts, where the length of haul may be excessive, a batching plant with truck mixers offers many advantages. In urban districts, where the yardage is high, the number of truck mixers required to make adequate deliveries makes the investment a subject for serious consideration. Some operators have considered a combination of the central mixing plant and the truck mixer to be advantageous, the latter being used for excessively long hauls and for jobs where the plasticity of the concrete is important. At least one operator of a central mixing plant has found it necessary to equip his yard with a dry batching plant to fill orders for batching materials; this batcher could, of course, be used for truck mixers.

The selection of the equipment will be dictated largely by local conditions and by the nature of the concrete to be supplied.

Effect of Transportation on Quality

Tests of concrete specimens, molded at various periods after the concrete was mixed, furnish ample evidence to show that considerable latitude may be permitted in the time elapsed between mixing and depositing the concrete without damaging its strength. Records* are available which show practically no reduction, and in some cases increases, in strength of concrete hauled from two to three hours in a truck equipped with an agitating device.

Probably the most comprehensive study of the effect of period of time between mixing concrete and placing it in the forms is contained in the paper by Gonnerman and Woodworth, listed in the footnote. While this was a laboratory study, it contains information directly applicable to field conditions. It is of interest to quote certain of the conclusions from this paper:

"(1) The most striking result brought out by this investigation was the small loss in compression strength due to standing for periods up to 6 hr. (produced from evaporation) of concrete remixed without the addition of water. *When the mixtures remained plastic and workable* the loss was practically nil. After the concrete ceased to be plastic the strength fell off rapidly. There was always a reduction of flow with an increase in standing period.

"(2) In concrete remixed with the addition of water to restore original flow after standing for periods up to 6 hr. (protected from evaporation) the strength was reduced in accordance with the increase in the water-cement ratio resulting from the added water.

"(3) When standing unprotected so that water was lost through evaporation an increase in strength resulted due to the lowered water-cement ratio."

Control of Quality of Concrete

The ready-mixed-concrete operator is in an ideal situation to take advantage of the most exact methods of designing and controlling the quality of concrete. He can and should install the necessary facilities for accurate proportioning. He should provide facilities for protecting concrete against cold weather, in localities where such protection is needed. Since the production of concrete is his principal business, he can familiarize himself with the most advanced information which has been developed in the laboratory concerning concrete.

It would be of interest to discuss the different methods of proportioning concrete which have been advanced, but that is a complete subject within itself.† However, a few fundamental principles may be stated.

Aggregates comprise about 70% of the weight and 80% of the volume of the average concrete, and it is not surprising that their quality plays a most important part in the quality of the finished concrete. The first essentials of an aggregate are that it be clean and consist of durable particles. Well-graded aggregates are necessary to the production of economical concrete and uniformity in grading is essential to uniform concrete.

Water-Cement Ratio Important

For given materials, the most important factor in controlling the quality of the concrete is the quantity of mixing water in relation to the cement. For workable concrete, given conditions of curing, etc., the strength of the concrete is fixed by the ratio of water to cement. Well-graded aggregates, rich mixtures, and dry consistencies require less mixing water than poor gradings, lean mixtures, and sloppy concrete, and hence perhaps produce higher strengths.

The ready-mixed concrete operator is in a position to design concrete of a specified strength and he should take full advantage of this fact wherever possible. Furnishing concrete on the strength basis rather than one of arbitrary proportions affords the principal opportunity for him to realize returns on his knowledge of concrete. The practice of specifying concrete by strength rather than proportions will come when the operator has demonstrated his ability to control quality.

Summary

Briefly stated, our observations of the ready-mixed concrete industry may be summed up in the following way:

1. The ready-mixed concrete industry gives promise of becoming a stabilized business and therefore does not offer prospects of more than a conservative return on an investment.

2. The field for ready-mixed concrete is broad enough to include all types of concrete construction and the opportunities for development in this direction are unlimited.

3. Only careful study of the actual or potential building program of a community will determine whether it can support a ready-mixed concrete plant. Generally speaking, a community with a population of 50,000 should, under favorable conditions, permit of the successful operation of a ready-mixed concrete plant.

4. Availability of raw materials is of first importance in the location of a ready-mix plant.

5. Measured by ordinary business experience, the gross sales of a ready-mixed concrete plant must be relatively large as compared with the investment.

6. The question of proper equipment for a ready-mixed concrete plant is a matter which can be determined only by a consideration of local conditions.

7. Tests have shown that ready-mixed concrete can be transported for any reasonable distance without deterioration in the quality of concrete by the use of equipment now available.

8. The ready-mixed concrete operator is ideally situated to exercise the equivalent of laboratory control over concrete used in ordinary construction.

Industry Rising Rapidly

The ready-mixed concrete industry has emerged from the obscurity of a minor factor in construction and has attained the proportions of an essential factor. A great many problems which beset it in the beginning have been solved satisfactorily, but there are questions which remain for solution, and many of these can be solved only through the collective efforts of the individuals in the industry.

Up to the present time there does not seem to have been any co-ordination of enterprise in the development of the industry. There have been no means for interchange of information or for working together in a joint program for the betterment of the industry and for the prosperity of the individual company. With the almost unlimited expansion of the program which seems to confront ready-mixed concrete, it should be well to keep in mind that other and new problems will be encountered in the future.

---

*Test data on this question may be found in the following articles:

"Central-Plant-Mixed Concrete Tested for Maximum Safe Haul." Public Roads, December, 1921, p. 22.

"Report on Field Test of Concrete Used on Construction Work," by W. A. Slater and Stanton Walker. Proc. Am. Soc. Civil Eng., January, 1925, p. 3. (See also "Retempered Concrete," National Sand and Gravel *Bulletin*, June, 1926, p. 19, and "Effect of Interval Between Mixing and Placing Concrete," National Sand and Gravel *Bulletin*, June, 1928, p. 11.)

"Retempering Concrete." Concrete Highways and Public Improvements. (See also National Sand and Gravel *Bulletin*, September, 1928, p. 35.)

"Tests of Retempered Concrete," by H. F. Gonnerman and P. M. Woodworth. 1929 Proc. Am. Conc. Inst. (Abstracted in February, 1928, issue National Sand and Gravel *Bulletin*.)

Circular of Good Roads Machinery Co., quoting tests carried out by the Columbia University, New York City.

"Tests of Truck-Mixer Concrete," by A. R. Hirst. *Engineering News-Record*, May 16, 1929, issue, p. 798.

†Among the publications which give information of general interest in this connection may be named the following: Bulletin 1, "Estimating Quantities of Materials for Concrete," Bulletin 2, "Relation of Aggregates to Concrete," and Bulletin 4, "Tables of Quantities of Materials for Concrete," of the National Sand and Gravel Association; Bulletin 1 of the Structural Materials Research Laboratory, Lewis Institute, Chicago; "Design of Concrete Mixtures," by Duff A. Abrams; "Design and Control of Concrete Mixtures," of the Portland Cement Association; and Bulletin No. 137 of the University of Illinois, "The Strength of Concrete, Its Relation to the Cement Aggregates and Water," by Arthur N. Talbot and Frank E. Richart.

Characteristics of the Ready-Mixed Concrete Business

By H. F. THOMSON

Vice-President, General Material Co., St. Louis

THE commercial operation in ready-mixed concrete as now established in a large number of communities is not the simple, somewhat haphazard throwing-together of cement, aggregates and water as implied by the old expression "concrete mixing," but is a complex activity involving the characteristics of several standard types of industrial effort. The following remarks discuss some of the features contributing to this complex-

ity. Analysis of these features may be informative alike to those now in the business and to those who may be merely watching this new development.

Concrete Must Be Suited to Character of Work

For the sake of clearness, we may define "ready-mixed concrete" as concrete delivered to the contractor at the site of the work, ready to place; it might better be termed "pre-mixed concrete," regardless of whether central-mixed or truck-mixed, or delivered by rear-dump or agitator trucks. It goes without saying that the concrete as delivered must be suited to the character of work. Such an activity belongs to the modern business world, and was impossible a generation ago because, aside from the improved technique of concreting itself, the agencies necessary for the business such as the telephone and motor trucks were not as readily available as now.

A Complex Business

The ready-mixed concrete business is a commercial application of the theories of mixing concrete, plus speed and reliability of delivery. To accomplish such a service necessitates a complex business. To note how complex we can mention the fields into which economists divide business activities. Thus five separate fields, under one of which most business endeavors may be classified, are all involved jointly in the ready-mixed business, namely, raw material production or commonly called the "extractive" field, the commercial, the manufacturing, the transportation and the construction fields. Each of these is a component of the ready-mixed business. The two remaining business fields named by economists—the financial and the professional—are not directly parts of the business, though the operator frequently has occasion to serve his customers both as banker and as engineer.

Raw Material Production

We can consider in some detail the portion of the ready-mixed business related to each of these usually independent types of business. First comes the raw material or aggregate production. If the concrete mixing and the aggregate production are operated by the same organization, then the concrete and the raw material branches can appreciate the other's problems. But if the aggregate and concrete are separate businesses, then the concrete mixing is still deeply interested in the aggregate production, because the quality and the cost of the concrete will depend to a marked degree upon the service in aggregates from the sister industry. By service in this case is not meant merely punctuality of shipments—that goes without saying—but further the quality of the aggregates themselves, not only cleanliness and soundness, but also uniformity in grading.

Some aggregate producers have appeared slow to recognize that improved quality of concrete—all concrete and not merely the pre-mixed—results from proper grading of both the fine and coarse aggregates and uniformity in all shipments of each material. Real service and co-operation mean more attention by the producers to this feature, which in some localities may require better screening equipment than was formerly acceptable. But the ready-mixed operation will not deliver to builders the better concrete of which it is capable, unless a supply of uniform aggregates of proper grading is available.

"Jobber" a Dominant Factor

The underlying and dominant characteristic of the ready-mixed business is undoubtedly that of the jobber, commonly called "material dealer." To a large extent the ready-mixed operation distributes materials produced by someone else (cement and aggregates) plus a special service for which a very nominal charge can be made. The problem of material supply, handling of materials and relations with contractors are much the same as in distributing concrete materials in the common manner. The same materials are delivered merely in a little different form than formerly. Accordingly, some established dealers have installed a concrete mixing operation as an additional department. In other cases, an independent organization for concrete mixing has sprung up which performs all the functions of the ordinary dealer with reference to concrete materials, and therefore merits consideration as a dealer, so long as the mixing operation serves without prejudice all calls from builders and is not operated by or for the special interest of one or a group of active contractors.

Manufacturing

But in addition to this jobbing characteristic there is a distinct manufacturing feature to the business. The raw aggregates and cement are fabricated into a different product, just as steel mills convert pig-iron into something different. This manufacturing is a function quite aside from the experience of the material dealer as such. It requires a full understanding and application of the technique of modern concrete mixing, in which the ordinary dealer is only casually interested. It involves responsibility for the quality of the materials used, because this affects the quality of the concrete delivered; it necessitates the training of a personnel for special production duties, just as much as the organization of an automobile factory or other manufactory. The commercial production of concrete must be handled efficiently to exist, because the margin between cost of materials and selling price is much narrower than with most manufactured products, as the materials represent roughly 75% of the selling price as compared to the 40% or less with most manufacturing.

In every sense, pre-mixed concrete is a manufactured product, produced under rigid control and delivered to the builder at the site of his work ready for use. It differs from brick or lumber or steel simply in being perishable. Its semi-liquid consistency facilitates the handling and final placing of this fluid stone. The production of the concrete in a central plant is distinctly a factory and not a construction operation, which should be recognized in the nature of the organization and in the type of personnel employed.

Merchandising

And as the ready-mixed business is new and involves special service features, the sales or merchandising end is quite different from the selling work usually done by the material dealer. Adequate merchandising of this new product requires both educational and advertising activities along the same lines as retailing any specialty. The convenience of using ready-mixed concrete has opened an outlet to householders, institutions and industrial plants who formerly either did not make the improvements or let the jobs accumulate until employment of a contractor was justified, but who can now do their own placing of concrete on the simpler work. Consequently, the diversity of sales activities which must be performed in introducing and developing the ready-mixed idea in any community represents a unique merchandising opportunity.

Transportation

After the concrete is mixed it must still be delivered, which is a most important feature of the operation. The transportation requirements are exacting—the consistency of the concrete must be suited to the nature of the work, it must reach the job in proper physical condition, when and at the rate wanted by the contractor, and must be delivered in a manner most convenient for the contractor to rehandle into final position. The modern dependable motor truck is the indispensable agency employed. But the moot question is that of the type of body to place on the trucks. Many types of equipment are offered, many ideas are being tried and some money is being spent in making changes; but all this is a part of the pioneering. As a whole the delivery service is improving steadily, and the contractors' requirements are being served more effectively. So far as the ready-mixed operator is concerned, the truck equipment will equally represent considerably more investment than the plant equipment; it also requires more personnel to operate and more attention to maintain. Hence the transportation end of the business is of grave importance and the success or failure may lie at this point.

Co-ordination with Local Practice

In addition to the factors involved in the mixing and delivering, the ready-mixed operation must be able to dovetail with the local construction practice. This involves more than mere familiarity with the contractor's work; it is frequently possible to

make suggestions regarding the delivery and handling of concrete at the job which result in better construction and economies for both the contractor and the vendor of the concrete. Successful application of the pre-mixed idea requires an unusual degree of co-operation between the mixing organization and the contractor's organization. Unless the greatest cordiality and co-operation exists, the delivery of concrete which is itself ideal for a given job may still not be satisfactory to both parties. This feature reflects back to the perishable nature of the concrete and hence is inherent with the ready-mixed business. Although the mixing of concrete at the central plant or in trucks is fundamentally manufacturing and not a part of the building operation until the material is delivered, still the tie-in with the construction field is so close that this can also be considered a component in the ready-mixed concrete business.

We thus see that almost the whole gamut of industrial types, which apply singly to most businesses, are all very definitely involved in the handling of ready-mixed concrete. This complexity carries with it a diversity of interest which is quite unique. This also means that the inference conveyed by some of our friends of it being a simple matter to set up a mixer in a material yard or to operate a few mixer-trucks is by no means the end of the considerations involved in developing a commercial pre-mixed operation.

Discussion on Ready-Mixed Concrete

Discussing these two papers, **Alexander Foster, Jr.** (Warner Co., Philadelphia, Penn.) called attention to the effective publicity work being done by the structural steel fabricators in their competition with concrete for commercial and industrial building, and stated that ready-mixed concrete is the answer. The point of the argument made by the structural steel fabricators is that steel is scientifically made by skilled workmen under conditions of absolute control, while concrete is made in a rough and ready way by unskilled employes under adverse conditions for obtaining control of the product.

"Controlled" Concrete Needed

Therefore, according to Mr. Foster, it is a prime essential that ready-mixed concrete be made with skill and carefully controlled in every step of its manufacture, and that constant tests to insure uniformity and constant watchfulness to insure the correct water content, and the use of high strength three-day cements were all essential to the best results.

Mr. Foster said it was advisable to have in the employ of the concrete company an engineer thoroughly familiar with concrete construction who would have to act more or less as a diplomat in dealing with engineers and contractors to see that the material was properly placed and taken care of as received at the job. He said that the big problem of the ready-mixed concrete industry was to keep out the manufacturer of shoddy material which would affect all of the ready-mixed concrete business in the end.

J. L. Shiely's Ready-Mixed Plant

J. L. Shiely (J. L. Shiely Co., St. Paul, Minn.) gave a very interesting recital of the experience of his company in the past year, which was its first year in the business in Minneapolis and St. Paul.

As a sand and gravel and crushed stone producer he was practically forced into the business to preserve his aggregates market, and being thoroughly sold on the fact that ready-mixed concrete was a step in the right direction towards more scientified concrete construction, he proceeded to build a plant that was thoroughly complete and which could be demonstrated to any engineer or architect that it had much the same scientific manufacture and control as goes into steel manufacture and fabrication, and apparently his company has succeeded very well in demonstrating this and he does not hesitate to guarantee the strength of the concrete made at this plant.

Careful Records Kept

The records of the plant are very complete so that it is possible to check back and know practically where every pound of cement is going, and this has proved very useful in at least one instance where the failure of the forms caused a serious accident and where there was the usual tendency to blame the failure on the concrete or the cement.

After the control of the quality of the product, Mr. Shiely said that the handling of the hauling equipment is the most vital factor, for when a customer wants deliveries, he usually wants them just as fast as possible when his forms are ready, and it is very necessary for a high grade salesman to go and plan with the contractor a system of delivery which will be satisfactory to both the manufacturer of the concrete and the contractor. The system of testing at the plant's own laboratory is very complete and rigid, but where a user wants to employ outside testing engineers, the concrete manufacturing company is willing to share half the expense of such outside inspection and tests.

Uses No Admixtures

Mr. Shiely said that his company did not use admixtures of any kind. He mentioned that light-weight burned clay aggregates of the haydite type were likely to offer serious problems to city sand and gravel producers, as they were receiving very serious consideration on a great many city jobs.

Mr. Shiely further suggested a special subdivision of the association, which was made a motion and carried, that the National Sand and Gravel Association form a group within itself of those interested in the manufacture of ready-mixed concrete, which could co-operate with the Portland Cement Association to take care of some of their joint problems of promotion and sales.

Uniform Concrete Specifications Needed

J. E. Burke (the Ready-Mixed Concrete Co., Pittsburgh, Penn.) spoke on what he termed the "bugaboos of 1929," stating that his company has a plan by which they think they have absolute control of quality, but that they had a great many troubles with users, which were attributed to being compelled in many instances to accept specifications requiring concrete from arbitrary mixtures. He said it would be much easier if every user would adopt specifications on the strength basis and leave it to the concrete manufacturer to make his own mixtures. He spoke also of the troubles encountered with the superintendent on the job and how necessary it was to have a high-class engineer to handle the deliveries expeditiously.

Mr. Burke cautioned all ready-mixed concrete manufacturers against guaranteeing strengths when making mixtures with high early strength cement, as it was impossible to predict what these cements would do.

Promotional Engineer for Kansas City

John Prince (Stewart Sand and Material Co., Kansas City, Mo.) mentioned that he and other producers in Kansas City were contributing to the employment of a high grade promotional engineer to work with the ready-mixed concrete manufacturers of Kansas City to offset the activities of an engineer employed by the structural steel fabricators along the lines mentioned by Mr. Foster.

Association Affairs

The report of the Trade Relations Committee, **Hugh Haddow, Jr.** (Menantico Sand and Gravel Co., Millville, N. J.), chairman, was preceded by a brief talk by **Henry P. Fowler** of the Chamber of Commerce of the United States.

Both Mr. Fowler's paper and the committee report dealt largely with the scope, theory and procedure of federal trade practice conferences.

Trade Practice Rules

The following recommendations were submitted in the report:

"1. A trade practice conference of the sand and gravel industry would be of dis-

tinct value to our business.

"2. A resolution should be adopted by this convention, requesting the Federal Trade Commission to call a trade practice conference of the sand and gravel industry.

"3. The Trade Relations Committee should be instructed to continue its work and to represent the industry in negotiations with the Federal Trade Commission.

Rules Quite Specific and Direct

"4. An effort should be made to emphasize the value of educating the industry to a full realization of what a trade practice conference means, to the end that its fullest possible advantages may be conferred upon the individual producer.

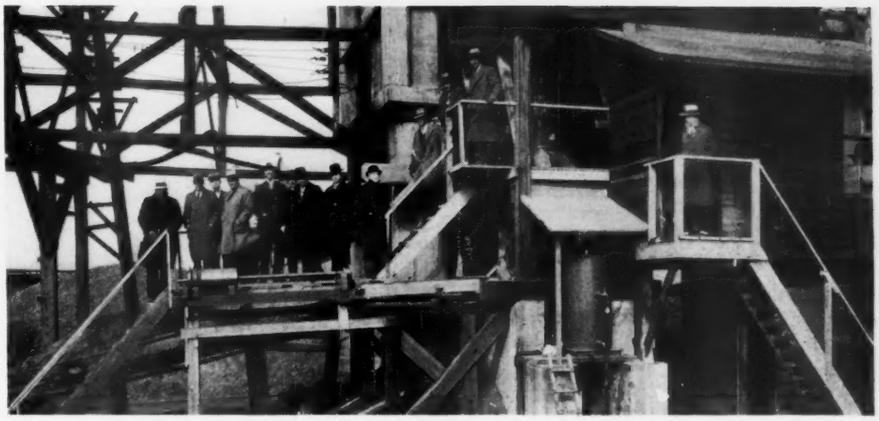
"5. Resolutions covering objectionable trade practices in the sand and gravel industry should be prepared at this convention, so worded as to leave no occasion for doubt concerning their meaning."

In accepting the report the convention adopted these recommendations.

The discussion of the report was largely in the form of questions directed at Mr. Fowler, or the chairman, in regard to the interpretation of specific rules, and in the course of the discussion the committee chairman read a list of 25 or 30 trade practices in the sand and gravel industry which it is believed are commonly violated. The rules given were only in tentative form, but they were much more specific and direct than the rules adopted by the crushed stone industry published elsewhere in this issue.

R. J. Potts (Potts-Moore Gravel Co., Waco, Tex.) spoke in favor of developing a code of numerous rules covering details rather than rules covering merely general principles.

V. O. Johnston (Lincoln Sand and Gravel Co., Lincoln, Ill.) said that he believed in taking advantage of every advantage that was offered in business, and that he thought the codes of business practice were a distinct advantage. Therefore he favored them.



A visit to the Central Sand and Gravel Co.'s plant was one of the features

Secretary's Report

In his report as executive secretary of the association, **V. P. Ahearn** bore rather heavily on the theory that such codes of business practice have teeth in them, and that it is possible to exercise considerable police power in their enforcement.

V. P. Ahearn (executive secretary of the association) in his annual report summarized business conditions in the industry, both in past years and the prospects for the immediate future, concluding that we are facing one of the biggest construction years in history. He reviewed the other activities of the association, including the work of the committee on cleaning and repairing railroad cars, the committee on depreciation scales for the sand and gravel industry, the committee on compensation insurance for marine operations, and reviewed in detail the work of the Washington staff both in matters of common interest and the many personal services rendered to members.

Schools for Salesmen

One of the most interesting suggestions made was for a school for sand and gravel salesmen to be established under the auspices of the association at Washington. Mr. Ahearn's ideas on this are quoted here in full:

"Scientific, well-directed salesmanship is necessary for the proper development of the sand and gravel industry. The criticism has been made that some producers, in the main, have neglected to emphasize the superior quality of their product and have overlooked the development of new markets within their sales territories which would provide additional outlets for their materials. Sand and gravel are highly specialized products and the real facts concerning their efficient use in construction work are gradually becoming recognized.

"It has been suggested that the association

Some of the visitors at the Central company's plant

should conduct at its Washington headquarters a course in the economics of sand and gravel, attendance at the course to be limited to representatives of member companies. Up to the present time the association has devoted most of its educational work to those outside of the sand and gravel industry. While this has been productive of very beneficial results so far as our consumers are concerned, it was contended that the association should now undertake to place more information concerning the use of sand and gravel in the hands of those who represent the sales force of member companies.

"The question is still before the board of directors for decision. A majority of the members are favorably disposed to the idea of a course in the economics of sand and gravel, but the pressure of other duties has not permitted the association staff to set a time for the course. It will not be held in the immediate future, but undoubtedly it has merit and will engage the further attention of the association as soon as conditions permit."

Research Activities

Stanton Walker (director of the Engineering and Research Division of the association) rendered a lengthy report on the activities of his bureau which was summarized in ROCK PRODUCTS' annual review issue, January 4, pages 128-130. This report will be reviewed and commented on in more detail in a later issue by Edmund Shaw.

Car Expense

J. C. Buckbee (Northern Gravel Co., Chicago, Ill.), chairman of the committee on the cost of cleaning and repairing railroad cars, reported the work of the National Sand and Gravel Association in co-operation with the National Crushed Stone Association and the National Slag Association in investigating the expenses that producers are put to prepare open top cars for shipment of their material, concluding that the three associations should engage in a co-operative program to accomplish the following:

"1. Minimize the expense of cleaning and repairing railroad cars.

"2. Minimize the expense now being borne by the railroads in maintaining types of cars unsuited to service.

"3. Minimize claims for losses of material in transit due to leaking cars.

"4. Improve the safety of railroad operation, as it should not be overlooked that leaking cars have been known to derail trains."

Safety Award

John Prince, past-president of the association, made the award of the two bronze tablets given by ROCK PRODUCTS to the winners of the safety contest instigated in the sand and gravel industry during 1929 under the auspices of the United States Bureau of Mines. The awards were made based on the records of twenty plants which were entered in the competition. These were divided into two classes so that in awarding the prizes the smaller plants would have an equal opportunity to win with the larger ones. These two classes were divided into the plants which worked more than 100,000 man-hours during 1929 and those which worked less than 100,000 man-hours during the year.

In the first class the winner was the American Aggregates Corp. Green Oak plant, Brighton, Mich. In the second class the winner was the plant of the Urbana Sand and Gravel Co., Urbana, Tex. The Urbana Sand and Gravel Co. plant worked 62,261 man-hours, and its record was no accidents and no days lost. The American Aggregates Green Oak plant worked 320,355 man-hours, had 14 accidents, with 92 days lost, which gave it an accident frequency rate of 43.702, and an accident severity rate of 0.287.

Honorable mention was given to the American Aggregates plant No. 1 at Columbus, Ohio, which worked 176,623 man-hours with twenty-four accidents, and 239 days lost, and to the Yahola Sand and Gravel Co., Keough, Okla., which worked 42,699 man-hours with no accidents and no days lost.

E. E. Mills, American Aggregates Corp., Greenville, Ohio, accepted the trophy on behalf of the American Aggregates Corp., and **Mrs. H. C. Filler** accepted on behalf of the Urbana Sand and Gravel Co.

Entertainment

The convention committee, consisting of W. W. Fischer, general chairman, L. T. McCourt, Walter L. Smith, V. A. Cordes and Walter F. Jahncke splendidly entertained the convention practically all the time when the members were not in session with a genuine Southern hospitality.

Members of the association visited the plant of the Central Sand and Gravel Co. at Memphis, where a barbecue was held under the auspices of the Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

Registration

ACTIVE MEMEBERS

American Aggregates Corp.
C. Gray, Indianapolis, Ind.
E. E. Mills, Detroit, Mich.
F. M. Welch, Greenville, Ohio.

Amory Sand and Gravel Co.
E. L. Puckett, Amory, Miss.
W. C. Robbins, Amory, Miss.

Arkansas City Sand and Gravel Co.
N. C. Dunn, Arkansas City, Ark.

Arkansas River Sand Co.
W. E. Rogers, Tulsa, Okla.

Arrow Sand and Gravel Co.
S. Stepanian, Columbus, Ohio.

Barnes Sand and Gravel Co.
C. M. Ault, Piketon, Ohio.

Bearden Gravel Co., Bearden, Ark., Benton Gravel Co., Inc., Benton, Ark., Cross County Gravel Co., Cherry Valley, Ark., Newark Sand and Gravel Co., Newark, Ark.
H. L. Dickinson, Benton, Ark.

Bellevue Sand and Gravel Co.
George H. Schneider, Bellevue, Iowa.

Beloit Sand and Gravel Co.
Ralph E. Jones, Chicago, Ill.

Biesanz Stone Co.
Charles P. Biesanz, Winona, Minn.

J. B. Blanton Co.
J. B. Blanton, Frankfort, Ky.

Blue Rapids Gravel Co.
Ed. Grundeman, Blue Rapids, Kans.

Brookhaven Gravel Co.
T. W. Maddux, Brookhaven, Miss.

Buffalo Gravel Corp.
R. W. Eberly, Buffalo, N. Y.
H. A. Stelley, Buffalo, N. Y.

Builders Sand and Gravel Co.
C. A. Jacobs, Chicago, Ill.

Camden Gravel Co.
C. P. McAllister, Camden, Tenn.

Central Sand and Gravel Co.
E. B. Bell, Memphis, Tenn.
Lee Bohlen, Memphis, Tenn.
C. S. Christian, Memphis, Tenn.
W. W. Fischer, Memphis, Tenn.
W. N. Fry, Memphis, Tenn.
Jack Harris, Memphis, Tenn.
J. Maners, Memphis, Tenn.
L. T. McCourt, Memphis, Tenn.
John D. Moran, Memphis, Tenn.
J. W. Petterson, Memphis, Tenn.
A. A. Tompkins, Riverside Park, Memphis, Tenn.
Douglas Smith, Memphis, Tenn.
Jim Wood, Memphis, Tenn.

Columbus Gravel Co.
A. B. Arnett, Columbus, Miss.
C. F. Harris, Columbus, Miss.
I. A. Harris, Columbus, Miss.
V. G. McGraw, Columbus, Miss.

Herbert L. Conlin
Herbert L. Conlin, Toronto, Ont., Can.
H. A. Wickett, Toronto, Ont., Can.

Consolidated Sand and Gravel Co.
A. G. Bennett, Toronto, Ont., Can.

Coon River Sand Co.
C. V. Ray, Des Moines, Iowa.

Crow Creek Gravel and Sand Co.
Oscar Kochtitzky, Forrest City, Ark.

J. K. Davison and Bro.
H. S. Davison, Pittsburgh, Pa.
H. H. Stewart, Pittsburgh, Pa.

Safety trophy awarded Brighton, Mich., plant, American Aggregates Corp., winner in the "large plant" class

Urbana Sand and Gravel Co., Urbana, Tex., won the "small plant" safety trophy for the best record in 1929

Des Moines Sand and Fuel Co-op. Association
Edward M. Gray, Des Moines, Iowa.
Dixie Sand and Gravel Co.
W. Jess Brown, Chattanooga, Tenn.
J. N. Dugan
J. N. Dugan, Cincinnati, Ohio.
Eastern Ohio Sand and Gravel Co.
A. E. Frosch, Steubenville, Ohio.
Eastern Rock Products, Inc.
R. M. Kelly, Utica, N. Y.
C. A. Munz, Utica, N. Y.
H. V. Owens, Utica, N. Y.
J. H. Wagoner, Utica, N. Y.
Eau Claire Sand and Gravel Co.
A. O. Ayres, Eau Claire, Wis.
Elkhart-Moraine Sand and Gravel Co.
L. L. Laun, Elkhart Lake, Wis.
Estill Springs Sand and Gravel Co.
L. G. Banner, Estill Springs, Tenn.
W. L. Hailey, Nashville, Tenn.
John A. Mefford, Nashville, Tenn.
W. H. Parrish, Jr., Nashville, Tenn.
Flint Crushed Gravel Co.
R. C. Fletcher, Des Moines, Iowa.
Florida Gravel Co.
W. B. Richards, Chattahoochee, Fla.
Fort Worth Sand and Gravel Co.
T. E. Popplewell, Fort Worth, Tex.
R. M. Quigley, Fort Worth, Tex.
General Concrete Products Corp.
F. J. Haggerty, Warren, Pa.
Georgia Gravel Co.
M. D. Avirett, Columbus, Ga.
C. F. Mullen, Columbus, Ga.
General Material Co.
H. F. Thomson, St. Louis, Mo.
Gifford-Hill and Co., Inc
F. R. Gifford, Grand Prairie and Dallas, Tex.
J. Rutledge Hill, Dallas, Tex.
L. E. Reel, Forest Hill, La.
J. A. Whyte, Dallas and Texarkana, Tex.
Grand Rapids Gravel Co.
H. R. Battjes, Grand Rapids, Mich.
William J. Breen, Grand Rapids, Mich.
J. T. King, Muskogee, Okla.
Greenville Sand and Gravel Co.
R. O. Lewis, Greenville, Miss.
W. E. McCourt, Greenville, Miss.
W. D. Haden Co.
Sid Clark, Houston, Tex.
W. A. Wansley, Galveston, Tex.
T. J. Hall Co.
Fred E. Hall, Cincinnati, Ohio.
Henderson Sand and Gravel Co.
W. C. Cooper, Henderson, Ky.
Samuel S. Stitt, Henderson, Ky.
T. L. Herbert and Son
L. J. Bolster, Nashville, Tenn.
Thomas L. Herbert, Nashville, Tenn.
Hillsdale Gravel Co.
Carlton C. Johnston, Sweetwater, Tex.
J. McAllister Stevenson, Sweetwater, Tex.
Holloway Gravel Co., Inc.
H. H. Holloway, Amite, La.
Hornaday Paving Co.
M. G. Hornaday, Memphis, Tenn.
Horton and Horton
George F. Horton, Houston, Tex.
Ideal Sand and Gravel Co.
Wayne A. McGowan, Mason City, Iowa.
C. E. Thomas, Mason City, Iowa.
Indiana Gravel Co.
Merritt W. Babcock, Indianapolis, Ind.
Frank J. Billeter, Indianapolis, Ind.
Indiana Sand and Gravel Association
S. C. Hadden, Indianapolis, Ind.
Iron City Sand and Gravel Co.
Charles Yon, Pittsburgh, Pa.
Janesville Sand and Gravel Co.
I. R. Jensen, Janesville, Wis.
Joliet Gravel Co.
John Sankey, Springfield, Ill.
Kansas Sand Co.
Otto Kuehne, Jr., Topeka, Kans.
L. W. "Speck" Heinly, Bonner Springs, Kans.
Keystone Sand and Supply Co.
W. A. Bliss, Pittsburgh, Penn.
Koenig Coal and Supply Co.
G. W. Waite, Detroit, Mich.
Kolola Gravel Co.
T. W. Townsend, Columbus, Miss.
Lawson Sand and Material Co.
C. G. Shackelsworth, Kansas City, Mo.
W. B. Winkler, Kansas City, Mo.
Lincoln Sand and Gravel Co.
H. D. Clouse, Lincoln, Ill.
V. O. Johnston, Lincoln, Ill.
McClain Sand Co.
T. M. Bowers, Point Marion, Penn.
H. R. Conn, Point Marion, Penn.
T. F. Lucas, Point Marion, Penn., and Morgantown, W. Va.
McCrady-Rodgers Co.
Phil K. Rodgers, Pittsburgh, Penn.
N. C. McGinnis and Co.
N. C. McGinnis, Memphis, Tenn.
Memphis Stone and Gravel Co.
I. S. Cooper, Memphis, Tenn.
W. H. McDonald, Memphis, Tenn.
R. D. Smith, Memphis, Tenn.
W. L. Smith, Memphis, Tenn.
Menantico Sand and Gravel Co.
Hugh Haddow, Jr., Millville, N. J.
Merom Gravel Co.
Ben Stone, Indianapolis, Ind.
Middlesex Sand and Gravel Co.
J. P. Blackman, Cambridge, Mass.
Mississippi Sand and Gravel Association
R. L. McChesney, New Orleans, La.
Missouri Portland Cement Co.
J. J. Foules, Memphis, Tenn.
Montgomery Gravel Co.
C. B. Ireland, Montgomery, Ala.
Moundsville Sand Co.
A. C. Swift, Moundsville, W. Va.
Muskogee Sand and Gravel Corp.
H. B. Barling, Muskogee, Okla.
G. P. Hevenor, Muskogee, Okla.
National Sand and Gravel Association
V. P. Ahearn, Washington, D. C.
M. M. Himmler, Washington, D. C.
C. E. Proudley, Washington, D. C.
Stanton Walker, Washington, D. C.
New Hope Gravel Co.
R. E. Lee, Columbus, Miss.
Northern Gravel Co.
F. A. Bingham, West Bend, Wis.
E. W. Boynton, Muscatine, Iowa.
E. W. Boynton, Jr., Muscatine, Iowa.
J. C. Buckbee, West Bend, Wis.
T. C. L. Nugent
T. C. L. Nugent, Louisville, Ky.
Ohio River Sand Co.
H. P. Caldwell, Louisville, Ky.
J. H. Duffy, Louisville, Ky.
Ohio River Sand and Gravel Co.
F. E. Barth, New Martinsville, W. Va.
R. E. Holland, Parkersburg, W. Va.
Oklahoma Material Co., Inc.
A. J. Mahoney, Enid, Okla.
J. H. Mahoney, Jr., Enid, Okla.
Peck-Thompson Sand Co.
F. W. Peck, Kansas City, Mo.
Pennsylvania-Dixie Cement Corp.
H. E. Allen, Chattanooga, Tenn.
Pine Bluff Sand and Gravel Co.
W. P. McGeorge, Pine Bluff, Ark.
Portsmouth Sand and Gravel Co.
F. C. Fuller, Portsmouth, Ohio.
Potts-Moore Gravel Co.
Robert J. Potts, Waco, Tex.
Price Sand Co.
C. W. Chandler, Tulsa, Okla.
J. M. Chandler, Tulsa, Okla.
Putnam Sand Co.
E. R. Putnam, Salina, Kans.
Ready Mixed Concrete Co.
J. E. Burke, Pittsburgh, Penn.
George B. Richmond
Huntington, W. Va.
River Sand and Gravel Co.
P. A. Yager, Owensboro, Ky.
Russellville Sand and Gravel Co.
Walter Myers, Russellville, Ark.
St. Louis Material and Supply Co.
Otto S. Conrades, St. Louis, Mo.
F. J. Reinke, St. Louis, Mo.
Saxet Sand and Gravel Co.
H. T. Brewster, Houston, Tex.
J. A. Darby, Houston, Tex.
Scranton Gravel Co.
Walter Myers, Russellville, Ark.
Seaboard Sand and Gravel Corp.
Harold T. Smith, New York City.
Sheridan Sand and Gravel Co., Inc.
LeRoy B. Light, Ottawa, Ill.
Ralph G. Near, Ottawa, Ill.
J. L. Shiely Co.
J. L. Shiely, St. Paul Minn.
Signal Mountain Portland Cement Co.
Frank G. Conkling, Chattanooga, Tenn.
D. M. Sparkman, Chattanooga, Tenn.
Capt. Charles A. Smith
Charles A. Smith, Oil City, Penn.
A. Snyder
Louisville, Ky.
Southern Sand and Gravel Co.
C. Pierson Cosby, Selma, Ala.
Stewart Sand and Material Co.
George H. Cook, Kansas City, Mo.
John Prince, Kansas City, Mo.
Tennessee-Arkansas Gravel Co.
C. C. Hawkins, Arkansas City, Ark.
Texas Construction Material Co.
T. J. Beesley, Houston, Tex.
W. H. Gemmer, Houston, Tex.
Texas Sand and Gravel Producers
W. W. Carson, Jr., Austin, Tex.
Texas Sand and Gravel Co.
Roy P. Eastland, Waco-Amarillo, Tex.
T. J. Palm, Waco-Amarillo, Tex.
Tulsa Sand Co.
G. E. Williamson, Tulsa, Okla.
Union Sand and Gravel Co.
J. L. Richmond, Huntington, W. Va.
Urbana Sand and Gravel Co.
Mrs. H. C. Filler, Urbana, Tex.
Utah Sand and Gravel Products Corp.
Eric Ryberg, Salt Lake City, Utah.
Warner Co.
R. C. Collins, Philadelphia, Penn.
Alexander Foster, Jr., Philadelphia, Penn.
Watters and McCarry
R. M. Watters, Columbus, Miss.
Western Paving Co.
O. A. Bridgeman, Oklahoma City, Okla.
Western Hills Sand and Gravel Co.
Charles M. Butz, Cleves, Ohio.
Western Pennsylvania Sand and Gravel Association
Ray V. Warren, Pittsburgh, Penn.
West Sand Co.
H. E. West, Muskogee, Okla.
Weston Sand and Gravel Co.
Harold B. Weston, Logtown, Miss.
Whitney Materials Co.
F. G. Wood, Duluth, Minn.
Willey-Ruckstuhl Co.
S. E. Willey, Cincinnati, Ohio.
Wolf River Sand and Gravel Co.
Thomas J. Billingsley, Memphis, Tenn.
W. A. Bridwell, Memphis, Tenn.
V. A. Cordes, Memphis, Tenn.
Marvin Davis, Memphis, Tenn.
R. I. Grogg, Memphis, Tenn.
W. L. Tollett, Memphis, Tenn.
Yahola Sand and Gravel Co.
W. S. Dills, Muskogee, Okla.

Registration—Guests

American Road Builders Association
C. N. Conner, Washington, D. C.
American Association of State Highway Officials
W. C. Markham, Washington, D. C.
Charles Avery Road Contractor
Charles Avery, Plainfield, Ill.
Barrow-Agee Laboratories, Inc.
J. H. Bateman, Memphis, Tenn.
Chamber of Commerce
C. M. Anderson, Memphis, Tenn.
Chesapeake and Ohio Railway Co.
D. Hubbard, Covington, Ky.
Convention Bureau, Chisca Hotel
R. E. Logeed, Memphis, Tenn.
F. W. Dodge Corp.
Thomas S. Holden, New York City.
Hercules Cement Corp.
H. Coffman, Philadelphia, Penn.
Mayor, City of Memphis
Watkins Overton, Memphis, Tenn.
Mississippi Valley Contractor
Lester Ford, Memphis, Tenn.
Missouri-Pacific Railroad Co.
W. M. Weigel, St. Louis, Mo.
National Builders Supply Association
Frank Dunning, Cleveland, Ohio.
National Crushed Stone Association
W. F. Wise, Dallas, Tex.
Portland Cement Association
J. E. Dunn, Nashville, Tenn.
George L. Nicol, Nashville, Tenn.
State Highway Department of Tennessee
T. E. Akers, Nashville, Tenn.
E. W. Baumann, Nashville, Tenn.
H. L. Bledsoe, Nashville, Tenn.
O. W. Hovis, Nashville, Tenn.
D. D. McGuire, Nashville, Tenn.
Dudley Ray, Nashville, Tenn.
U. S. Bureau of Mines
Frank Cash, Birmingham, Ala.
J. R. Thoenen, Washington, D. C.
U. S. Bureau of Public Roads
F. H. Jackson, Washington, D. C.
U. S. Department of Commerce
R. L. Lockwood, Washington, D. C.
Washington University
W. H. Wheeler, St. Louis, Mo.
West Baden Hotel
R. F. Hall, West Baden, Ind.

Machinery Manufacturers Other Than Exhibitors

American Steel and Wire Co.
R. S. Green, Chicago, Ill.
Davenport Locomotive and Mfg. Corp.
G. G. Bogue, Davenport, Iowa.
English Bros. Machinery Co.
L. E. Matthews, Kansas City, Mo.
J. B. Harbison Equipment Co.
J. B. Harbison, Little Rock, Ark.
H. W. Moore, Little Rock, Ark.
Hydrotator Co.
W. L. Remick, Hazleton, Penn.
International Harvester Co. of America
G. B. Abbott, Chicago, Ill.
Ludlow-Saylor Wire Co.
E. S. Robson, St. Louis, Mo.
Joe Lyons Machinery Co.
Maxwell J. Lyons, Little Rock, Ark.
Marsh and Truman Lumber Co.
A. Fletcher Marsh, Chicago, Ill.
H. J. Miller Lumber Co.
R. Kohlmeyer, Seattle, Wash.
H. J. Miller, Seattle, Wash.
New York Belting and Packing Co.
A. E. Carriere, New York City.
O. K. Clutch and Machinery Co.
S. O. Nafziger, Columbia, Penn.
Osgood Co.
Charles R. Peterson, Marion, Ohio.
Page Engineering Co.
E. J. Breton, Chicago, Ill.
Pidgeon Thomas Iron Co.
J. D. Monk, Memphis, Tenn.
Ryan Manufacturing Corp.
L. B. Sherman, Chicago, Ill.
S. K. F. Industries, Inc.
P. G. Gaddis, New York City.
Street Bros. Machine Works
Harold P. Street, Chattanooga, Tenn.

Traylor Vibrator Co.
Paul Wigton, Denver, Colo.
Hugo W. Weimer
Hugo W. Weimer, Milwaukee, Wis.
Western Wheeled Scraper Co.
L. H. Kraeger, Memphis, Tenn.

Manufacturers' Exhibit

Allen Cone and Machinery Corp., New York, N. Y.—Exhibited a working model sand settling and classifying cone with pump, motor, etc. Also samples of products produced by cones operating in series. Distributed new bulletin No. 35. Represented by M. C. Pohlkotte.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.—This company through the co-operation of the Central Sand and Gravel Co. were hosts to many producers on a visit to the latter's plant to witness a 7-in. Style B Newhouse crusher in operation. Luncheon was served at the plant. In their booth this exhibition displayed bulletins on their new centrifugal vibrating screen, also on their crushers, screen equipment, motors, Texrope drive, etc. Represented by H. Crawford, A. Goldberg, W. C. Johnson, G. W. Shores and W. F. Taylor.

American Manganese Steel Co., Chicago Heights, Ill.—Displayed a model of their 12-in. pump, also a working model of the Swintek ladder equipped with Amsco chain. Also panels of photographs showing this company's dredge service to the sand and gravel industry. Represented by A. L. Blakemore, Bradley S. Carr, A. W. Daniels, P. Nagle and A. W. Peterson.

Barber-Greene Co., Aurora, Ill.—Displayed an interesting panel set which included moving pictures of their portable conveyors and bucket loaders with vibrating screen in operation. Also displayed a model of the Leahy screen which is used in connection with their new Model 42 B-G bucket loader. Represented by D. B. Frisbie and R. Greene.

C. O. Bartlett and Snow Co., Cleveland, Ohio—Displayed a panel of photographs showing the transportation of concrete in their movable "V" bodies. Also moving pictures of ready-mixed concrete trucks in service. Represented by L. R. Wilson.

W. H. K. Bennett Co., Chicago, Ill.—Exhibited a working model of their 12-in. Diamond pump and cutter. Represented by W. H. K. Bennett and J. W. Meckenstock of the Pettibone Mulliken Co.

Blaw-Knox Co., Pittsburgh, Penn.—Displayed panels of photographs of their buckets, bins, etc. Featured the "Stepanian" truck mixer. Represented by J. G. Riley.

Bucyrus-Erie Co., South Milwaukee, Wis.—Showed a working model of their model 120-B electric shovel using standard controls. Also literature on their line of excavating equipment. Represented by P. H. Birckhead, E. J. Wilkie and F. O. Wyse.

The Buda Co., Harvey, Ill.—Displayed a standard 120-hp. M.A.N. complete Diesel power unit. Also literature on other sizes. Represented by A. F. Ochtman.

The Cincinnati Rubber Manufacturing Co., Cincinnati, Ohio—Exhibited samples of Arno conveying belt and Arno dredge sleeves. Also an array of photographs of Arno belt and sleeve installations. Represented by L. P. Darnell, J. W. Reed and C. M. Young.

Cross Engineering Co., Carbondale, Penn.—Exhibited cross sections of all meshes and sizes of perforated metal such as used in the sand and gravel industry. Represented by W. S. Nicol.

Deister Machine Co., Fort Wayne, Ind.—Exhibited their triple deck 3x6-ft. "Plato" vibrating screen. Also literature. Represented by I. F. Deister and B. J. Roberts.

The Dorr Co., New York, N. Y.—Displayed working models of the "Dorrco" sand washer and the Dorr bowl classifier. Represented by T. B. Ford and F. H. Jones.

Dravo Contracting Co., Pittsburgh, Penn.—Displayed an attractive tri-panel rack of photographs of sand and gravel dredges, barges, tow boats and other floating equipment for sand and gravel operations. Represented by W. F. Fowler, A. C. Leigh and T. S. Marvel.

Eagle Iron Works, Des Moines, Iowa—Exhibited working models of their Eagle "Swintek" screen nozzle ladder and Eagle washer. Also their Eagle flume sand classifier. Represented by T. Aulman, O. G. Du Pius and C. B. Laird.

Fairbanks, Morse and Co., Chicago Ill.—Displayed a 3-in. centrifugal pump direct connected to a 12-hp. ball bearing F.-M. motor. Also a series of panels showing F.-M. Diesel engines, pumps and motors in use in the sand and gravel industry. Represented by W. E. Biggs, J. A. Brown, F. H. Butler, F. H. Dickson, G. T. Podlesak and T. M. Robie.

General Electric Co., Schenectady, N. Y.—Exhibited the now famous "Casey Jones." "Casey" is a toy electric train which runs, stops and reverses at a verbal command of the operator. Impulses of the voice are transmitted through an ordinary telephone receiver and act on a 6-brush control switch. As the train rounds a curve, the beam from its headlight falls on a grid-glow tube and this in turn switches on an electric G-E sign. Also displayed streamer discharge and photo-electric photometer for accurately measuring the intensity of light. Represented by W. A. Gluesing, K. H. Runkle and L. W. Shugg.

Good Roads Machinery Co., Inc., Kennett Square, Penn.—Had working models of "Champion" crusher, "Champion" sand wash box and "Good Roads" vibrating screen. Panels of photos showing sand and gravel plants equipped with their equipment. Represented by E. C. Brown.

Harnischfeger Sales Corp., Milwaukee, Wis.—Displayed a working model of the P. and H. 600 crawler crane loading gravel into a bin. Also photos and moving pictures showing their line of excavating equipment in operation. Represented by H. M. Davison, G. L. Lillard, B. E. Onkst, P. A. Raicke, P. Verhey and H. R. Walton.

The Hayward Co., New York, N. Y.—Showed working models of their dragline, clamshell and orange-peel buckets. Also moving pictures of the various applications of their buckets. Represented by H. C. Ryder.

Hendrick Manufacturing Co., Carbondale, Penn.—Exhibited perforated screen plates for vibrating screens and flat plates and grating. Also their Weston testing screen for samples of gravel or stone down to ¼-in. and samples of 25 to 100 lb. in weight. Represented by D. W. Blackburn and B. G. Shotton.

Hetherington and Berner, Inc., Indianapolis, Ind.—Exhibited an exact working model of their new "Type R" anti-friction bearing heavy duty dredge pump. Also bulletins covering this and other types of pumps. Represented by R. Berner, C. J. Hodge and W. D. Kinnaird.

Highway Truck Mixer Co., Cleveland, Ohio—Showed moving pictures of a truck mixer in action. In addition this company demonstrated a truck at the Fischer Lime and Cement Co.'s plant. Represented by H. L. Bachman, C. H. Grant and A. M. Swasey.

Kensington Steel Co., Chicago, Ill.—Exhibited "Oro" manganese steel castings of sprockets with renewable teeth, buckets, dipper teeth, crawler parts. Represented by E. C. Bauer and K. Jensen.

The Jaeger Machine Co., Columbus, Ohio—Distributed from their booth a broadside describing Jaeger Trail or Truck mixer, a new self-dumping type truck that mixes concrete while in transit. Represented by H. Fraas.

A. Leschen and Sons Rope Co., St. Louis, Mo.—Displayed samples of "Hercules" red strand wire rope, sizes ¼ to 2 in. Represented by W. G. Gerhardt and E. J. Seale.

Link-Belt Co., Chicago, Ill.—Exhibited a one-third size operating model vibrating screen, a Shaw classifier, a speed reducer and a roller bearing equipped conveyor idler. Also moving pictures of a Link-Belt equipped sand and gravel plant. Represented by C. S. Huntington, G. H. Olsen, A. K. Schifflin and H. L. Strube.

Manganese Steel Forge Co., Philadelphia, Penn.—Displayed all sizes of "Rol-man" double lock-mesh, woven manganese steel screens. Also samples of fine mesh double crimped screen. Represented by P. M. Hobbs, J. G. Logan and W. H. Potter.

The Marion Steam Shovel Co., Marion, Ohio—Displayed large panel of photos of shovels and cranes in sand and gravel operations. As usual, this company conducted an interesting guessing contest—"How many pieces of gravel in the jar?" The correct number was 943. First prize, consisting of matched woods and irons golf clubs, was won by E. W. Boynton, Northern Gravel Co., Muscatine, Iowa, with a guess of 938. Second prize, a golf jacket, was won by J. R. Thoenen, U. S. Bureau of Mines, Washington, D. C., with a guess of 950. Third prize, a golf bag, was won by H. Coffman, Hercules Cement Corp., Philadelphia, Penn. Fourth prize, golf shoes, was won by D. D. McGuire, Tennessee Highway Department, Nashville, Tenn. The Marion company was represented by F. E. Artz, D. G. Brown, J. J. Dibney, F. B. Jennings and C. E. Silva.

McLanahan and Stone Machine Co., Hollidaysburg, Penn.—Exhibited their shaking screen, single roll crusher of unbreakable steel construction, and double log washer. All were working models. Represented by G. E. Krider and C. McLanahan.

Morris Machine Works, Baldwinsville, N. Y.—Exhibited a one-eighth size working model of a 12-in. sand and gravel dredge with complete equipment. This exhibit attracted unusual attention. Also displayed a manganese steel shell liner for their new heavy duty line pump of 6-in. size. A new bulletin, No. 136, describing the new pump, was also distributed. Represented by V. J. Milkowski and F. S. Salchenberger.

The New Jersey Wire Cloth Co., Trenton, N. J.—Displayed samples of their various sizes of screen cloth. Also "Blue Center" steel wire rope. Represented by J. F. Berger and C. C. Steinhauer.

Niagara Roller Bearing Screens, Buffalo, N. Y.—Exhibited a cross section of vibrating scalping screen and cross section of vibrating sizing screen. Also photos of various sizes and models. Represented by A. J. Schaeffer.

Nordberg Manufacturing Co., Milwaukee, Wis.—Showed their new Symons vibrating screen. Also photographs and drawings showing the design and working principle of the Symons disc and cone crusher. Represented by A. C. Colby and C. B. Watrous.

Northwest Engineering Co., Chicago, Ill.—Displayed panels of photographs showing their line of excavating and material equipment. Represented by M. E. V. Howe and H. A. Hutchins.

The Ohio Power Shovel Co., Lima, Ohio—Showed photos of the "Lima 101" in use at sand and gravel operations as a shovel, dragline, crane and drag shovel. Represented by H. Barnhart, J. M. Howard, H. P. Steinbrenner and R. K. Willis.

The Perfect Classifier Co., Nashville, Tenn.—Displayed a one-third size working model of classifier fully equipped with S.K.F. bearings. Represented by H. H. Hooper and S. R. Puryear.

Pit and Quarry, Chicago, Ill.—Displayed copies of current issues of their publication. Represented by A. J. Hoskins, S. A. Phillips, V. E. Larsen and W. E. Trauffer.

Plymouth Locomotive Works (Fate-Root-Heath Co.), Plymouth, Ohio—Showed photographs of various models of their locomotives. Also new bulletin, No. A-24, on new model ML gas locomotive. Represented F. T. Buzard.

ROCK PRODUCTS, Chicago, Ill.—Displayed copies of the new "Directory of the Rock Products Industry," which contains information on the plants of the industry with maps of each state showing locations of plants. Also copies of the Annual Review Number and of current issues. Represented by G. M. Earnshaw, W. B. Lenhart, Nathan C. Rockwood and Ralph C. Sullivan.

Ross Screen and Feeder Co., Chicago, Ill.—Displayed an interesting working model of their Ross chain feeder, screen feeder and grizzly feeder. Also sections of their large chain and descriptive literature. Represented by W. Ross and E. Webster.

Sanford-Day Iron Works, Inc., Knoxville, Tenn.—Showed moving pictures of automatic drop bottom cars in a sand and gravel pit. Also exhibited working model on runway showing its drop bottom feature. Represented by G. E. Jones, Jr.

Sauerman Bros., Inc., Chicago, Ill.—Displayed a model of their "Crescent" dragline bucket. Also catalogs on their dragline and slackline cableway systems. Represented by D. D. Guilfoil, H. F. Reed and J. N. Schufreider.

Simplicity Engineering Co., Durand, Mich.—Displayed a working model of their double deck gyrating screen. Represented by F. D. Barber, G. W. Benke and G. H. Cooper.

Smith Engineering Works, Milwaukee, Wis.—Distributed catalogs covering their line of crushing and sand and gravel plant equipment. Represented by V. H. Jones.

Stephens-Adamson Manufacturing Co., Aurora, Ill.—This exhibit featured the company's new "Vibrator" screen. Sections and photographs showed several unique features, including a new rapid acting clamp for screen panels, grid support, and a suspension mounting to minimize vibration transmitted to buildings. Their "Simplex" belt conveyor carrier, "J.F.S." variable speed reducer and box car loader were also shown. Represented by C. H. Adamson, C. Krause, H. W. Newton, E. J. Patton and T. A. Ruddy.

Stoody Co., Whittier, Calif.—Displayed their hard surfacing and welding rods, also surface grinders. A display of dipper in the various stages of building up with "Stoodite" proved interesting. Represented by R. L. Adams, F. C. Heppel, D. F. McCandlish, R. L. Ozias, G. E. Pennel and M. C. Smith.

Taylor-Wharton Iron and Steel Co., High Bridge, N. J.—Exhibited a display rack containing "Tisco" products, among which were pulverizer hammers, gears, wear plates, chain, sheaves, dipper teeth, screen cloth, elevator buckets, jaw plates, concaves and miscellaneous manganese steel parts. Represented by R. Moore and J. A. Trainor.

The Thew Shovel Co., Lorain, Ohio—Displayed photographs of "Lorain" crawler and locomotive shovels and cranes. Represented by M. B. Garber, O. Galbraith, G. D. Laurell, O. H. Miller, L. T. Moore, D. G. Savage, V. L. Wheeler and R. H. Wilson.

Transit Mixers, Inc., San Francisco, Calif.—Showed moving pictures of their Paris transit mixer operating in various types of work. Also literature covering some of the features of the "Transit System Mixed Concrete." Represented by E. F. Hill, Jr.

The W. S. Tyler Co., Cleveland, Ohio—Displayed a 4x6-ft. type 60 "Hum-mer" screen, heavy duty type. Also showed photographs of typical installations and test sieves ranging from 200 mesh to 1 in. Represented by A. D. Busch and C. H. Peters.

Vulcan Iron Works, Wilkes-Barre, Penn.—Distributed literature on their line of steam and gas locomotives for sand and gravel plants. Represented by J. F. O'Brien.

F. M. Welch Engineering Service, Inc., Greenville, Ohio—Represented by F. M. Welch.

Thirteenth Annual Convention of the National Crushed Stone Association

Most Important Meeting Since Its Organization—Code of Business Practice Adopted

THE 13TH ANNUAL CONVENTION of the National Crushed Stone Association at Cincinnati, January 20-23, probably marked the most important step taken by the organization since it formed 12 years ago. In connection with this convention was held the Trade Practice Conference of the crushed stone industry, which adopted a code of business practice, placing the crushed stone industry among the first 100 industries in the United States to adopt such a code.

W. F. Wise, president of the Southwest Stone Co., Dallas, Tex., was re-elected president of the association, and practically all the other officers and directors continued in office with a few exceptions noted farther on.

The following report of the convention is divided under five general heads:

(1) Pleasantries and generalities.
(2) Business conditions generally, and in the industry in particular.
(3) Uses, markets, advertising and selling methods for crushed stone.
(4) Production and operating problems.
(5) Association affairs and progress.
(6) Trade Practice Conference.

As the pleasantries and generalities are common to all conventions, and this convention was honored by more than the ordinary number of dignitaries, their speeches and remarks are quite a considerable part of the proceedings, but we will pass over them here, for they will be published in full in the official proceedings of the convention later on.

W. F. Wise, re-elected president

Business Conditions

As usual, one of the principal subjects on the program was the report on business conditions by the directors of the association for their respective territories. They are quoted in full as follows:

Reports of Directors on Business Conditions

W. M. Andrews (Lake Erie Limestone Co., Youngstown, Ohio): While 1929 was only a fair year for the commercial stone producers in western Pennsylvania, it was very good for the producers of fluxing stone. Our competition with slag was extremely keen and we understand the slag producers' activities are now extended to reach into eastern Pennsylvania, but we hope that with the aid of our mutual friend, Mr. Goldbeck, the condition will be greatly improved.

The prospects for 1930 are exceptionally bright, as the program of the Pennsylvania Highway Department is considerably larger than any heretofore attempted, and as a matter of fact the highway officials are somewhat worried regarding the ability of the aggregate producers in certain parts of the state to furnish sufficient aggregates to carry through this program.

Overproduction in Central States

H. E. Bair (France Stone Co., Toledo, Ohio): This report covers conditions of operating and marketing in the central region during the year 1929. An increased overproduction accounted for by improved efficiency in production, distribution and new plant construction, as well as a falling off in demand, had the effect of a material reduction in the market level of prices below that existing prior to the year 1929.

The demand for material for railroad development and highway construction was normal, but building construction experienced a decided reduction.

The outlook for next year indicates no improvement in the conditions caused by over-production. An increasing demand is not anticipated. Producers facing a falling market will give more attention to the tonnage factor in its effect on costs. Therefore a more highly competitive situation is anticipated than existed during the past year.

Better Preparation of Products

Due to the tendency on the part of engineering authorities generally to strengthen their specifications calling for a high class product as well as an earnest desire on the part of the producers to improve products to the end of securing the best results, considerable attention is being given to better preparation. A number of marked improvements to attain this end have been made in plant operation.

While operating under the present marketing conditions, increased efficiency per man is a necessity. There have been no marked improvements in plant equipment tending toward a material reduction in operating costs. Labor rates have not been affected.

L. R. Cartwright (Mid-West Rock Products Corp., Indianapolis, Ind.): There has been nothing outstanding in the crushed stone business through central Indiana and Illinois during 1929. An average amount of material was furnished for road building, and there was a larger demand for agricultural limestone.

The 1930 program for this territory calls for increased mileage in hard surface roads. If this is limited to concrete under present specifications, most of the coarse aggregate will be gravel. On the other hand, if specifications are modified and black top roads maintain their present proportion as a whole, there should be an increase in next year's demand for crushed stone.

Indiana and Illinois Producers Show Co-operation

One of the most pleasing observations from last year's business is more apparent harmony among producers, and in most instances a disposition to at least try to obtain reasonable prices. The Trade Practice Con-

ference should do much toward establishing such a policy throughout the industry.

Uniform Cost System Needed

One of the first requirements to this end will be a uniform cost accounting system for the entire organization. The National Crushed Stone Association is far behind other national organizations in this particular. Nothing can be done looking to a fair selling price unless all are figuring costs on the same basis.

And may I make this final suggestion, which is somewhat akin to the above, that we lend support to the movement now fostered by leading contractors, dealers and manufacturers' organizations for a liberal discount for prompt payment of bills. Experience shows that 10 cents per ton discount for cash in 30 days on crushed stone has a wholesome effect in weeding out irresponsible contractors and naturally reduces accounts receivable.

We look for better than average business during 1930.

New York Tonnage Off

J. E. Cushing (Cushing Stone Co., Schenectady, N. Y.): Ballast business for the year past was not so good as in 1928 and as the demand for commercial sizes was no better, the tonnage produced in this district was slightly less than that of the year previous. To offset this, however, the demand was fairly steady and with ideal weather conditions the season as a whole was satisfactory. Selling our ½-in. stone continues to be a problem and will become a more serious matter if a new market is not found for this size stone. Indications point to 1930 being a normal year.

Canadian Quarries Had Good Year

C. M. Doolittle (Canada Crushed Stone Co., Ltd., Hamilton, Ont.): Despite the very marked reduction in the western crop, which is reflected particularly in our decreased railway earnings and the bad break in the market, Canada has in 1929 experienced a year of prosperity.

The large cities, Montreal, Toronto, Hamilton, Vancouver and Ottawa, have evidenced real building activity—the building trade returns show an increase for 1929 over the previous year of some $104,000,000.

The railways have made very large expenditures for rock ballast and new equipment, and despite decreased earnings, no curtailment is to be made in their 1930 rock ballast program and their other commitments will exceed 1929's by many millions.

We have now in the provincial highway system of the province of Ontario alone some 1293 miles of paved highways, 404 miles of macadam and 704 miles of improved gravel roads. Revenue from tourists visiting Ontario amounted to more than $100,000,000, and the Department of Highways for Ontario plans an expenditure of not less than $20,000,000 yearly.

All of the quarries in Canada have had a good year. My own company had sales of well over 1,000,000 tons in 1929. An indication of the position of the crushed stone industry in Canada can best be gaged from the fact that three Canadian quarries have joined the National Crushed Stone Association, thereby materially increasing our representation.

Despite the fact that the liquor sales in Ontario amounted to some $64,000,000, its people have been sober and industrious. Our liquor law—government control—with the profits going into the government coffers has again proven a real success and eliminated bootleggers.

Confidence in 1930 Prospects

We look forward to the coming year with every confidence. Our immense natural resources that are being developed sanely and scientifically reflect the fundamental soundness of Canada's business prosperity.

We face the future as optimistically as any other people and more so than most.

Pennsylvania Producers Looking for Large Year

F. O. Earnshaw (Carbon Limestone Co., Youngstown, Ohio): Although we enjoyed good tonnage in 1929, I am pleased to report that generally speaking, 1930 should be one of the largest years ever experienced by crushed stone producers. The fluxing stone tonnage in 1929 was larger than in 1928 and we anticipate 1930 will be on about the same level as 1929. The railroad ballast business will probably carry through with about the same tonnage as previously.

Enormous Road Program

The high spot of 1930 will be the highway program of Pennsylvania. We are anticipating the largest construction program ever put through in the history of the commonwealth. In 1929, 530 miles of concrete pavement were constructed along with several hundred miles of macadam. For 1930, contracts will be awarded covering the construction of about 1100 to 1200 miles of concrete highways, 100 miles of macadam and the state forces will construct an additional 200 to 250 miles of macadam, making a total of approximately 1500 miles. In addition, the township program is exceptionally large—approximately 2000 miles of road will be repaired in some form or other. In this there will probably be 200 to 250 miles of hard surface with a macadam type of construction.

The construction program is of such proportions that Mr. Eckels, chief engineer of the highway department, has appointed a special committee to assist in the successful fulfillment of the program. On this committee is represented the Department of Highways, the bonding companies' representatives and representatives of the slag and stone interests. P. B. Reinhold, secretary and treasurer of the Pennsylvania Stone Producers' Association, represents the stone interests.

Local Associations Consolidated

We are also pleased to report that the producers of eastern and western Pennsylvania have consolidated their associations into a general body; and under the able leadership of F. T. Gucker we are making considerable headway and feel that we are arriving at intelligent solution of some of our problems. The freight-rate situation is gradually being corrected, whereby there will be practically a uniform mileage basis of rates throughout the state. For the first time in the history of the industry there is now a mileage scale of rates covering pulverized limestone in the middle section of Pennsylvania.

Several new plants have been constructed during 1929 to take care of the stone requirements in their immediate territory. These plants are principally for state highway construction.

With the continuance of the present motor license fund and the gasoline tax, it would appear that the Pennsylvania Department of Highway's construction programs will continue for some years to come on the present high mileage standard.

Poor Demand in Texas

E. Eikel (Dittlinger Lime Co., New Braunfels, Texas): The total tonnage reported to the Southwestern Division of the National Crushed Stone Association for the year 1929, six members reporting for the entire year and one for the last six months only, was slightly less than 1,000,000 tons. This total is low and the year must be characterized as one of less than average demand.

It is not possible to give an accurate estimate of tonnage marketed in 1929 by nonmembers, but I believe that it can be conservatively stated that 90% of the total tonnage of commercial crushed stone marketed in Texas was sold by members of the Southwestern Division.

All members reported railroad service as having been satisfactory throughout the year.

Accidents Fewer

In general, labor was plentiful and relations between employe and employer satisfactory to both parties at all times. Some of the plants located in the northern part of the state experienced a labor shortage early in the summer, but this was not of long duration.

As an average proposition, there were fewer accidents of all kinds, and especially accidents of a serious nature, in the plants of the members of the Southwestern Division than in any recent past year. Work done in the interest of safety has helped in every plant, and one plant reports very good results.

No new plants were built in Texas during the year, nor were major changes made in

any of the existing plants. However, screening facilities were increased and improved at practically all plants.

One consolidation of interest to the industry took place. This was the merging of the Texas Trap Rock Corp., the Stringtown Crushed Rock Co. and the Southwest Stone Co. into a single corporation. These three plants are now being operated as the Southwest Stone Co., under the direction of President Wise of this association, and the main office of the company is located at Dallas, Texas.

Outlook Only Fair

The outlook for 1930, as I see it, is only fair, taking our section as a whole. In some localities prospects seem to be good, while in others indications are that conditions will be no better than last year. The Texas State Highway Department will have quite a large program, but due to changes in its source of revenue for 1930 an accurate estimate of the total funds available for construction can hardly be made at this time.

Strong Competition Lowered Prices in Northern Ohio

E. E. Evans (The Whitehouse Stone Co., Toledo, Ohio): During the year just ended the territory known as northwestern Ohio has shown a slight slump in demand and in some localities a marked reduction in sales price. The decreased demand has brought on a highly competitive situation which in turn is responsible for a lowering of plant prices.

Operating costs were approximately at the same level as in 1928, resulting in a narrowing of margin between cost and sale price. There is no indication that the situation will be materially improved during the present year.

Little Price Cutting in Eastern Territory

John Rice (General Crushed Stone Co., Easton, Penn.): Reporting for western and central New York, eastern Pennsylvania, southern New Jersey, eastern Maryland and Delaware and eastern Massachusetts, I would say that the year of 1929 was substantially the same as 1928. There was about the same amount of railroad ballast used and a vigorous campaign of road building.

The associations in New York and Pennsylvania are both active and there has been a very friendly relationship among the members. There has been comparatively little price cutting, various producers having been apparently satisfied by accepting the business in that territory in which they can most satisfactory and profitably serve.

From every appearance there will be an increased program of highway construction in 1930, and probably a slight increase in railroad maintenance which will stimulate the purchase of ballast. So far as can be seen at this time, the prospects for the future are quite satisfactory for our industry.

F. T. Gucker (John T. Dyer Quarry Co., Norristown, Penn.): In eastern Pennsylvania the demand for crushed stone in 1929 was less than in 1928, but we are hopeful for a better season for 1930.

New England Producers Optimistic

W. E. Hilliard (New Haven Trap Rock Co., New Haven, Conn.): I am presenting the report covering the territory represented by **A. L. Worthen,** that is the territory of Connecticut and Massachusetts.

A survey of the business conditions affecting producers in Connecticut and Rhode Island indicates that satisfactory conditions prevailed in general throughout 1929. Five producers reported an increase in tonnage for 1929 over 1928 with only one reporting a decrease. The market price seems to have remained about the same with one or two companies reporting slightly lower average prices.

There is a general feeling of optimism with respect to business for the coming season. Plant additions are being made which will add from 2500 to 3000 tons to the daily plant capacity of the territory.

Boat Shipments and Muddled Politics Upset Chicago Market

A. T. Goldbeck: W. P. Hodgkins (Brownell Improvement Co., Chicago, Ill.) is not present, but I have the following report submitted by him:

The stone business in Chicago and the states immediately surrounding it has not been favorable during the past year. Highly competitive and combative local conditions in Chicago, plus new boat competition of stone, sand and gravel, plus the unsettled tax situation in the city and Cook county, have made this year in Chicago probably the most chaotic one in a considerable length of time.

The state of Illinois has done little work in comparison to 1928, due to its funds for road building being sorely depleted and funds which it will derive from the gas tax not having been collected for this year's work. In addition to this, the gas tax is at present under litigation, and if this is not over before soon it means that Illinois will be a poor territory for crushed stone for another year. However, when the gas tax is finally settled, Illinois will be a stable and good market for crushed stone.

It will be a matter of time before the crushed stone market in Chicago is again stabilized and the price situation is again on a profitable basis. However, it is naturally my hope that this will come about in the near future, as the volume of material to be used here in the next five years will be increasing constantly.

Agstone in Good Demand in Illinois

E. J. Krause (Columbia Quarry Co., St. Louis, Mo.): In general, southern Illinois' consumption of limestone during 1929 exceeded that of 1928, but only slightly. The volume of stone for construction purposes fell off somewhat, but an unprecedented demand for agricultural limestone showed enough tonnage to offset losses in other types and carried practically all of our producers to tonnage levels exceeding those of other years. The results of a healthy spirit of co-operation were extremely gratifying. It is generally conceded that without this spirit of co-operation it would have been impossible to have moved the tonnage of agricultural limestone that was moved. I might add here that we generally estimate the tonnage of agricultural limestone moved in Illinois as approximately 1,000,000 tons; almost one-half of what was used in the entire United States the year before.

St. Louis' New Specifications Allows Limestone in Wearing Surfaces

Perhaps even more pleasing was the opening of the St. Louis city paving specifications to allow limestone in the wearing surface of streets and alleys—a signal accomplishment. Through the combined efforts of producers in our district, together with the help of Mr. Goldbeck (the value of whose work in this connection is inestimable), St. Louis specifications were changed to allow limestone as well as gravel, trap rock and granite in the wearing surface. Producers had worked for years on this job and it may be safely said that without the aid of the National Crushed Stone Association, and particularly Mr. Goldbeck, it would never have been accomplished.

Better Year Looked for in Illinois

We believe that consumption in southern Illinois during the year 1930 will exceed consumption during 1929. Due to lack of funds, the state of Illinois did very little paving in our district during 1929, but receipts from the gas tax during 1929, together with receipts for this year, should insure an expenditure this year that will equal the past year. Under the present plan, whereby a portion of this sum is rebated to the counties for secondary road construction, we feel that it is going to make each county a little more "highway conscious," which should, in itself, result in a greater stimulation of the consumption of road materials.

Budgets in 1930 for railroads and other public utilities equal, and in most cases, exceed those of 1929 so far as we can learn. President Hoover's plea, we have no doubt, will stimulate expenditures for public improvement. We feel also that the easier tone of the money market will have its effect in stimulating private enterprise in the building line as soon as thorough adjustment is made to the late market reaction.

Since, in our opinion, prices have been thoroughly well stabilized, we do not look for an upward trend, but there is a tendency to keener competition, as it is clearly apparent that the potential capacity of the producers far exceeds the demand for their product.

Production Increases in Massachusetts

A. S. Lane (John S. Lane and Son, Inc., Springfield, Mass.): A survey of the Massachusetts plants indicates a general increase all along the line in output for 1929, the actual increases ranging from 10% to 50%. It would appear that 1929 tonnage as a whole was approximately 25% greater than 1928. Prices as a rule remain unchanged. Two companies, however, report slight decreases in their prices. One company only reports changes underway, which will increase its plant capacity by 15%.

A heavy ballast program by the railroads, together with President Hoover's recommendation for public works appropriations, would seem to insure good business for our industry this year. Some quarries in the eastern part of the state consider the prospect good for the largest production yet experienced. In our own district, however, we are inclined to think that the demand will be less than last year.

St. Louis Conditions Poor

E. J. McMahon (St. Louis Quarrymen's Association, St. Louis, Mo.): Speaking for eastern Missouri and the district around St. Louis, I wish to report that the past year was sub-normal. Our road and street program held up in fair shape, but there was a serious loss in building, amounting to over 50%.

For 1930 there is bound to be an improvement in building, and we will have an increased program for state, county and city, so this coming year should show an improvement over last.

I wish to second the remarks made by Mr. Krause and on behalf of the St. Louis Quarrymen's Association, I want to again thank the association, its present officers, Mr. Wise, his predecessor, Mr. Graves, Mr. Boyd and especially Mr. Goldbeck for a number of visits to St. Louis which brought about the change of specifications and which opened the way to parity with other aggregates for the first time.

Russell Rarey (Marble Cliff Quarries Co., Columbus, Ohio): It will not only save time but will prevent repetition if you will accept the reports of Directors Bair and Evans as covering the district of Ohio quite generally.

Big Volume, Low Prices in Tennessee

H. E. Rodes (Franklin Limestone Co., Nashville, Tenn.): It was not my intention to say anything about the Bureau of Engineering in my report, but your remark leads me to say that we from western and central Tennessee feel that we would be practically off the map if Mr. Goldbeck hadn't given us the assistance which he did.

The industry enjoyed a big volume of business in 1929, at a very low average price—probably the lowest in years, as every plant in the district seems to have increased its capacity. The states of Kentucky and Tennessee have a somewhat increased highway program for next year, but production appears to have increased beyond the requirements in the western and central sections of both states, and unless the work of the Mississippi river flood control projects takes a considerable tonnage of gravel for concrete work in this district over-production seems certain in 1930, with low prices and a badly disturbed market condition.

Unseasonable Weather Affected Jersey Production

F. W. Schmidt (North Jersey Quarry Co., Morristown, N. J.): Operatng conditions in the early part of the 1929 season were bad, due to excessive amount of rain. Conditions during the summer were favorable, but the sudden cold spell and snow the latter part of November caused the closing down of most of the road work, thus bringing our season to a close somewhat earlier than usual. The demand for our products during 1929 was about 10% less than the requirements for the previous season. There was a tendency toward a reduction in prices, on account of over-production in the territory.

The North Jersey Quarry Co. and affiliated companies produce approximately one-half of the stone in this district. During the past season several of its plants were operated at a rate of only 50% of their capacity. Notwithstanding this condition, other producers are constantly increasing their capacity, which we feel will have a tendency to further reduce prices for the 1930 season.

It looks to us as if the stone business in general was following in the footsteps of the soft coal and the oil industries; that is, producing far in excess of the market requirements.

Business Good in Iowa

J. F. Schroeder (Linwood Cement Co., Davenport, Iowa): The general business in the states of Iowa and western Illinois has been quite satisfactory when speaking of volume and according to the program which is outlined it should continue to be so for a number of years.

The prices, however, have been lower than what they should be and it is rather difficult to foresee how there may be an improvement. The cement plants in the state of Iowa also produce coarse aggregate for paving and concrete building construction, and when making a bid for the business the coarse aggregate price is very often tied up with the cement quotations; and this rather conceals the actual price which is being received for the coarse aggregate, leaving the firms who are producing coarse aggregate only in the dark as to what prices to quote when trying to secure business. For this reason it is very difficult for any of the aggregate producers to know just what prices to ask, and therefore the price received is not based on cost plus a legitimate profit, but it is in most instances based on the salesman's guess as to what he might be able to secure a certain contract for.

The aggregate producers of the state of Iowa are steadily trying to improve these conditions and we hope that we may be able to do so in order that at least a moderate amount of profit may be secured for the business done.

New Virginia Industries Stimulate Stone Production

John W. Stull (Liberty Lime and Stone Co., Rocky Point, Va.): In Virginia and its border states there has been brought to a completion many of the vast industrial plants that were organized for building in 1928 and many of these are now in full operation. This is particularly true of the industrial rayon plants that are now producing great quantities of this product. I might say that in Virginia today we are on the verge of manufacturing what is estimated to be at least 65% of the rayon products that are manufactured in the United States. I say this with pride in my own state. The construction of these large plants has brought such business in commercial crushed stone of various sizes and practically all of our producers have been benefited through this business alone. The general building trades, however, were less active than in 1928.

Much stone has been used for road building purposes the past year and the railroads have used a normal quantity of stone for track ballast. These sources of use have done much to stimulate the stone business and although some quarries, because of unfavorable location, have not been able to operate successfully, it can be safely stated that generally the business has been satisfactory throughout the entire Virginia territory.

The outlook for 1930 is certainly as good as it was a year ago for 1929 and personally I believe it to be better. My reason for so believing is that our cities and small towns are growing, the highway departments are having more money to spend on highways and the railroads are talking expansion. All of these indicate general good business.

Georgia's 6 c. Gas Tax Should Help Producers in 1930

T. I. Weston (Weston and Brooker Co., Columbia, S. C.): I seem to be the representative for Georgia, South Carolina and North Carolina. Georgia has never produced as much stone as it should produce on account of the gravel and slag industries pressing in from Alabama. During 1929 there was a large new plant of half a million capacity built near Atlanta. This business in Georgia has been stationary; no increase and not much business in 1929. The Georgia legislature has authorized a 6-cent gas tax, which will make about $18,000,000 a year

available for highway construction in Georgia. Therefore, there will be some stone used there this coming year.

Carolina Conditions Improving

The program in South Carolina has been depressed during 1929 on account of the fact that we were changing over from the "Pay-as-you-go" plan to the bond issue plan. There will be $65,000,000 spent in South Carolina during the next three years, commencing this year. There will be 600 miles of road built in South Carolina each year for the next three years.

North Carolina completed a large road building program in 1928. Therefore, the stone industry was very much depressed in North Carolina during the past year. However, there will be a considerable amount of money available for 1930 and this will increase the business in North Carolina to about normal.

Prospects in Ohio

In his address Monday noon, **Gov. Myers Y. Cooper** of the state of Ohio discussed highway conditions in his state, saying that they now had 11,000 miles of roads in the state highway system and that most of the cities were connected by excellent highways, and yet, that of the 11,000 miles of that system 4000 miles required heavier, wider and better surfacing than they now have, and that the state is adding about 200 miles a year to the state highway system.

The governor also said that there were 23,000 miles of county roads and 50,000-odd miles of township roads in the secondary road system which can no longer be ignored by the state highway authorities. He inferred that the improvement of such roads, not only in the state of Ohio, but in the United States, was and would continue to be part of the solution of the farm relief problem to which the federal government is giving so much attention and pledged relief.

Practical Farm Relief

Governor Cooper stated that in Ohio they had gone about farm relief in a very practical way by raising the gas tax from 3 to 4 cents, thus providing $8,500,000 more a year for state highway development than they had the year before, of which $2,500,000 was spent on the secondary road system. He said that the state of Ohio is now spending $4,000,000 a year in 62 of its rural counties for educational purposes, and that at least a third or one-half of this amount really goes into transportation of the school children and consequently enhances the desirability for good roads.

The governor also touched on the desirability of awarding contracts for building construction in winter in order that contractors might keep their organizations intact, and make their plans and purchases for such work as could be done in the winter and early spring.

Governor Cooper told of the method by which he had gone about to answer the inquiry of the President of the United States last November in regard to the amount of prospective construction work in Ohio, and from a thorough check-up with the county commissioners and municipal and township officers arrived at an estimate of a total of $84,000,000 for county and township road building, and $150,000,000 more for municipal work, making a total of $234,000,000 for public improvements in Ohio alone, and that 70% of this would probably be put under contract during the first half of the year.

Business as Usual for 1930

Discussing economic conditions for the country as a whole from the point of view of a builder, as Governor Cooper is in private life, he said: "I am not very much of a hand to make a prediction, but I am going to make one right here and now, and I make it as one of you, a business man who has studied the trend of economic events for a good many years.

"First of all, the response of the country in speeding up improvements these first six months through a prudent expenditure of public money is a sound policy. We are all agreed on that. Now then if we get by, and we are getting by, the first six months of 1930, so far as business is concerned, you will never know there was a debacle in the stock market. It will be business as usual and everybody will go whistling to work. That is my prediction."

Organize for Prosperity and Progress

The balance of Governor Cooper's talk was an appeal to conduct business along honorable, decent and correct lines, ending up with the statement: "If you haven't been all the way down the line and back again in 1930, then you have got some disappointments ahead. If you haven't surveyed carefully the things that were bringing success in 1929 and the things wherein you have failed, and taken account of these things, applying the successful realizations to 1930, if you haven't done these things then there will be no one to blame for your failure except yourself. Business is determined to appropriate the best things. Hence organization and more organization and more organization for progress and prosperity."

Transportation—Past and Present

M. J. Gormley (executive vice-president and chairman, Car Service Division, American Railway Association, Washington, D. C.) spoke on "Transportation—Past and Present," telling how the railroads since 1923 had rehabilitated the entire transportation system of the country, so that now greater volumes are handled with far less cars than in 1923, because of better efficiency in the use of cars and greater ton mileage per car. At that time the Shippers' Advisory Board was instituted. There are 13 of these boards and car service divisions, each contains committees representative of the various large industries operating in the particular district. These committees make reports every three months on the prospective car loadings for their district. These forecasts have generally been so accurate that a good many economists and financiers use them as a sort of business index for the coming quarterly period, Mr. Gormley said. Further, since these boards were started there has been no serious car shortage, he stated.

He also spoke of the large railroad betterment program for 1930, predicating his optimistic view of 1930 business on this and other pertinent facts.

County Road Building

Charles M. Upham (engineer-director, American Road Builders Association, Washington, D. C.) at the Wednesday morning, January 22, session, spoke on the problem of county road building, emphasizing the necessity of concentrating attention on really important county roads to prevent a dissipation of highway funds. He said that 32% of the counties in the United States are now spending more on maintenance than on construction, and that such maintenance in a great many instances is an uneconomic use of road-building funds. He said further that we had arrived at a time when everyone interested will have to go to work to maintain the present road-building program; that in numerous instances the enthusiasm for road building was tending to weaken, and that the solution of the problem of proper and scientific financing was the method by which to continue promotion of road construction.

Good Prospects for 1930 Seen by Economist

At the banquet on Wednesday evening one of the three speakers, **George E. MacIlwain,** business economist of Detroit, Mich., painted a rather cheerful picture of business prospects for 1930, particularly in the construction industry, where he thought the amount of construction would probably be more than in 1929. He even predicted that conditions in the automobile industry would not be so bad as people believed.

Uses, Markets and Selling Methods

Under the subject "To What Extent Does a Highway Bond Protect the Materials Producer?" **Harold Williams,** attorney, Boston, Mass., discussed the security for payment of sales of stone for public works under the laws, pointing out that it is impossible to have a mechanic's lien on government property. Further, he discussed the security provided by a surety company bond, stating that while surety company bonds were

much better than they used to be, they are still far from a satisfactory sort of security. He stated, however, that there is a ready-made, perfect security, for, while the producers cannot sue a state without its consent, the states, counties and municipalities engaged in public work are the very best debtors. He said: "Today I know that any lawyer who has a claim of this kind to collect is very much more interested in the money in the hands of the state, county or town than he is in a lawsuit against the bonding company."

Paul M. Tebbs (assistant chief engineer, Pennsylvania Department of Highways) explained the situation in the state of Pennsylvania, where the law requires that the contract shall be completed and six months may elapse before a claimant may bring suit, and then the suit must be brought within the ensuing six months.

Bond Does Not Always Protect

John Rice (General Crushed Stone Co.) pointed out from an experience of his own that crushed stone delivered to the state highway and placed in a stockpile, which never got into the road, was not covered by the bond, and the stockpile was subsequently sold and the producer did not get any protection from the bond. Mr. Tebbs qualified this by stating that had the state highway department been given an opportunity it would have stepped in and claimed the stone and intervened, because any account of that kind is the fault of the contractor and the department could have held the material required to be used for completion of the work.

In Case of Failure, Who Is Responsible?

Mr. Rice explained another peculiar situation which is to be tested in the courts. A contractor failed and the surety company took over the contract, let it to another contractor and the surety company took a bond from another surety company. The second contractor failed and the question is: Who is responsible? The original surety company claims that the producer furnished the material to the contractor without any bond, which illustrates the necessity of being careful to avoid similar difficulties.

Must Know Where Material Is Used

John W. Stull (Liberty Lime and Stone Co., Rocky Point, Va.) described a case where a contractor had two contracts for the same municipality and the stone was shipped to the same point within that municipality. It developed that after the failure of the contractor, the bonding company would compel the producer to prove on which contract the material was used, which required considerable work, and an appeal to the original contractor for a memorandum giving that information.

Mr. Stull used this as an illustration to show that the producers must know on which contract the material to be furnished is to be used so that they can explain to the bonding company just what material was furnished and what it was used for.

Freight Prepayments

The discussion continued with relation to the liability of the surety company in case of prepayment of freight, and from the discussion by Messrs. **H. E. Rodes** (Franklin Limestone Co., Nashville, Tenn.), **P. B. Reinhold** (Reinhold and Co., Inc., Pittsburgh, Penn.) and others, it developed that the law in different states varied somewhat in this regard. For example, in Pennsylvania, according to Mr. Reinhold, it is possible for a producer to quote his product on a delivered basis and invoice it so, so that the freight is included in the surety bond covering the purchase of material.

Co-operation Between Producers and Engineers

Paul M. Tebbs (assistant chief engineer of the Pennsylvania Department of Highways) spoke on the subject of "Co-operation Between Producers and Construction Engineers." He mentioned especially the very large highway construction program in the state of Pennsylvania for 1930 promoted under the stimulus of President Hoover's prosperity program, and the problem the highway department faced on this account.

This problem the state highway authorities and the producers are attempting to work out in co-operation so that shipments of materials may be made early and by the middle of July it is hoped to have a surplus of highway construction materials in stock to the extent of 500,000 tons. These 500,000 tons will be stored in various scattered parts of the state and will not entail a very large stockpile on any individual job.

Mr. Tebbs said that certain contractors were going to find it difficult to store sufficient materials on the job and for that reason many of the stone producers would be asked to store their own materials or have them available for prompt shipment when required for the work.

Financing Materials in Storage

In regard to financing the materials in storage, Mr. Tebbs said that unfortunately, in accordance with the state laws, it would not be possible for the state to carry the financial burden, although it has the money in hand to do so. The state can contract only for a completed job and cannot pay for the material until it is in place, and consequently the state highway department stands ready to receive suggestions and is willing to co-operate if some method can be devised for financing this storage. He said that a great deal depended on whether the contractor was properly qualified and, if so, he did not think that the carrying of this storage would be an undue burden to any of the parties concerned.

Clean Materials Important

Another matter emphasized by Mr. Tebbs was the great necessity for good, clean products. He said: "In considering the cleanliness of the material, we must bear in mind that any of the fine stone, dust or clay which exists in the aggregates is a dilutant of the cement and has no considerable effect upon the coarse or fine aggregates, and if there is half of a percent. of fine materials in the aggregates, and if your mixture is 1:6, that half percent. of aggregates becomes 3% when it is compared with the cement alone."

Mr. Tebbs said the suggestion is made from various sources that the state highway department inspect and accept the aggregates at the point of manufacture. He said that the department had not seen fit to do so, that there are certain products which it is almost necessary to inspect as they are manufactured, but in the case of aggregates, which do not change their characteristics, he thought inspection of these qualities at any time or place was sufficient. He said the producers themselves were just as capable of having men who can determine the qualities of aggregates at the plant as the state, and he anticipated the time when producers would employ their own inspectors.

Trained Sales Engineers Needed

Mr. Tebbs emphasized the desirability of having properly trained sales engineers who could qualify to help in seeing that business was done with contractors financially capable of assuming the responsibilities of the job and of paying for material of the right quality, and not merely sales representatives seeking orders regardless of the qualifications of the material for the job or the contractor for doing the work.

Therefore, according to Mr. Tebbs, there is an opportunity for construction engineers and material producers to co-operate to eliminate bad business risks to the mutual advantage of all concerned.

Among the things to be on guard against, according to Mr. Tebbs, is the over-expansion of relatively able but small contractors who are likely to assume responsibilities beyond their capacity to fulfill.

In concluding, Mr. Tebbs said: "We want to work with you to improve your supply; as Governor Cooper very ably said, 'Don't mistake economy for parsimony.' It is necessary to spend a little money to put out a better product. I am saying that for the benefit of a great many stone producers who have not been progressive, and not to those of you who are progressing so splendidly."

Simplification of Stone Sizes

Under the general grouping of uses and markets of crushed stone were a number of very interesting and valuable papers, the first of which was on the possibilities for the simplification of crushed stone sizes by **R. L. Lockwood,** Division of Simplified Practice of the United States Department

of Commerce, Bureau of Standards, Washington, D. C.

Mr. Lockwood described in a general way the organization of the Division of Simplified Practice and what it is trying to accomplish in the elimination of avoidable waste through the weeding out of unnecessary styles, sizes, etc., of manufactured products, so as to facilitate mass production and distribution. He gave numerous examples from all industries with which they had co-operated, emphasizing particularly the reduction in the number of sizes of paving brick as the one perhaps nearest comparable to the crushed stone industry. He then described the procedure in going about a conference for the simplification of standards, and enlarged upon the desirability of working out some national standards for crushed stone.

Standardization of Commercial Sizes of Crushed Stone

A. T. Goldbeck (director of the bureau of engineering), who reported as chairman of the sub-committee on the standardization of commercial sizes of crushed stone, explained the questionnaire recently mailed to the industry asking for information in regard to the type of screens used, and said that thus far replies had been received from approximately 100 plants. The accompanying tables give a summary of the general practice in screening in the crushed-stone industry based on the analyses from these 100 plants:

SCREENS MOST LARGELY USED

Revolving		Vibrating		Shaking	
Round in.	Square in.	Round in.	Square in.	Round in.	Square in.
3 1/2 (10)			1 (6)		
3 (17)			3/4 (6)		
2 3/4 (14)			5/8 (6)		
2 1/2 (19)			3/8 (6)		
2 1/4 (10)			1/2 (10)		
2 (18)			1/8 (6)		
1 3/4 (9)					
1 1/2 (19)					
1 1/4 (23)					
1 (17)					
3/4 (19)					
7/8 (5)					
5/8 (10)					
3/8 (5)					
1/2 (8)					
1/4 (10)					

(Note: The numbers in parentheses indicate the number of screens of the size reported.)

SCREENS USED TO A LESSER EXTENT

Revolving		Vibrating		Shaking	
Round	Square	Round	Square	Round	Square
6 (1)	3 3/4 (1)	3/8 (1)	2 1/2 (3)		2 (1)
4 1/2 (2)	3 (1)	1/4 (1)	2 1/4 (1)		1 1/2 (1)
4 1/4 (2)	2 3/4 (2)	3/16 (1)			1 1/4 (1)
4 (3)	2 1/2 (2)		2 (3)		1 1/8 (1)
3 (1)	2 1/4 (2)		1 1/2 (4)		1 (1)
2 5/8 (1)	2 1/8 (1)		1 1/4 (4)		3/4 (2)
2 3/8 (1)	2 (2)		7/8 (3)		5/8 (1)
1 5/8 (3)	1 3/4 (2)		9/16 (1)		1/2 (3)
1 3/8 (1)	1 1/2 (2)		5/16 (4)		3/8 (2)
1 3/16 (1)	1 1/4 (1)		3/16 (3)		1/4 (2)
1 1/8 (2)	1 1/8 (1)				1/8 (1)
1 1/16 (1)	1 (3)	No. 2	(1)		
5/16 (2)	13/16 (1)	No. 20	(1)	No. 4	(1)
3/16 (2)	3/4 (1)				
	11/16 (1)				
	9/16 (2)				
	1/2 (4)				
	3/8 (1)				
	5/16 (1)				
	1/4 (1)				
	3/16 (2)				

(Note: The numbers in parentheses indicate the number of screens of the size reported.)

Proposed Standard Sizes of Crushed Stone

Mr. Goldbeck's report stated: "Your committee suggests the following commercial sizes as 'standard sizes.' These are most commonly used, and other sizes which may be demanded from time to time might be known as 'special sizes.'

(Note: Stated at present in terms of round opening laboratory screens. If square openings are finally adopted, the present round opening sizes must be translated into their approximate square opening equivalents.)

0-¼ in. Fine screenings for waterbound macadam, fine aggregates in concrete.

0-¾ in. Coarse screenings for waterbound macadam aggregate for bituminous concrete.

¼-½ in. Fine dustless screenings for bituminous surface treatment, bituminous concrete, roofing.

¼-¾ in. Coarse dustless screenings for bituminous surface treatment, bituminous concrete, traffic bound roads, bituminous macadam, coarse aggregate in concrete building construction.

¼-1¼ in. Coarse graded bituminous concrete, portland cement concrete, sheet asphalt binder, traffic bound construction, black base, concrete, building construction.

¼-2½ in. Coarse aggregate in concrete pavements, black base.

¾-1¼ in. Mixed-in-place bituminous concrete, binder for sheet asphalt, retread, bituminous surface treatment, choke material in macadam construction.

1¼-2½ in. Bituminous macadam, waterbound macadam, railroad ballast, black base sewage disposal.

2½-3½ or 4 in. Bituminous macadam, waterbound macadam, railroad ballast, sewage disposal.

"All other sizes in addition to the above will be known as 'special sizes.'

Standard Sizes Possible

"Your committee reminds the crushed-stone industry that it alone cannot standardize the sizes it produces. Consumers are as much interested in a size standard as producers. Hence, standardization must ultimately be the outcome of co-operative effort on the part of both producers and consumers. Your industry can at present merely express its desires as to what kind of a size standard it thinks would be desirable from the producers' standpoint. The consumer is represented by various national technical organizations and he expresses his desires through the standard specifications of these organizations.

"Finally, the various ideas thus expressed through these national bodies of consumers and producers must be brought into harmony before a size standard will become possible. Fortunately an agency already exists whose duty it is to harmonize and bring together the various bodies interested in simplification and standardization. This is the Division of Simplified Practice of the Bureau of Standards of the United States Department of Commerce. After we have progressed sufficiently far in our own efforts at standardization we shall then be in a position to make application to the Division of Simplified Practice to help formulate a set of standard sizes in co-operation with other interested agencies."

Research and Sales

John W. Stull (Liberty Lime and Stone Co., Rocky Point, Va.) reported as chairman of the research committee, stating that the research work done in the laboratory of the association during the past year involved six major projects, as follows:

(1) The effect of gradation on the strength of concrete.

(2) Studies to determine a method for the design of concrete for a given beam strength.

(3) Studies on the soundness of aggregates.

(4) Investigations of flat and elongated pieces, soft fragments and other deleterious material.

(5) Preliminary investigations on stone sand.

(6) Routine investigations in connection with the development of new quarries, study of oil-coated stone, stone supposedly unsound, stone containing rust-stained fragments, etc.

Mr. Stull stated that the committee was convinced of the great importance to the industry of this research work and of the results, and he said that the results obtained gave every indication of being of very great practical value. He said he thought the bituminous materials investigations to be undertaken this year would be even more important to the crushed stone industry, if anything, than the work done on concrete and concrete aggregates.

Research Activities of Association Laboratory

A. T. Goldbeck (director of the bureau of engineering) in his report of the work of the research committee covered much the same ground as in his article on the activities of the research department of the na-

tional association in ROCK PRODUCTS, January 4, pages 133 and 134. These briefly are listed as follows:

(1) The effect of voids in crushed stone on the strength or properties of resulting concrete.

(2) Comparative tests of crushed stone and gravel, the purpose of which Mr. Goldbeck said had been much misunderstood. The primary purpose was not to make comparisons of various aggregates and if such comparisons were necessary to the attainment of the final aim of the investigations, the real purpose is to attempt to develop a means for the design of concrete which will have a given beam strength irrespective of the type of aggregates used.

(3) Investigations of the soundness of stone which have developed the fact that the sodium sulphate test is a very unsatisfactory one and it is hoped to substitute for it a freezing and thawing test.

(4) Studies of stone screenings for the purpose of developing a greater market for them.

(5) Investigations of flat and elongated pieces to find out whether specifications requiring not more than 5% of such pieces are defensible.

(6) Special investigations for individual producers.

(7) Effect of dust-coated stone on the strength of concrete which have shown that dust coatings up to 5.7% have very little effect on the strength of concrete, and that after one year test concretes containing dusts show fully as high strengths as those without dust.

(8) Bituminous investigations which thus far are merely proposed and are awaiting an appropriation of some $13,000 to $14,000 for necessary laboratory equipment.

Ready-Mixed Concrete Plants

Arthur C. Avril (Avril Tru-Batch Concrete, Inc., Cincinnati) gave an informal talk on his ready-mixed concrete plant, distribution and sales methods, illustrated by moving pictures, somewhat along the same lines of his article in ROCK PRODUCTS, January 4, pages 157 to 161.

Highway Stone Requirements

A. S. Rea (chief engineer, bureau of tests, Ohio Department of Highways) at the session on Tuesday afternoon, devoted to discussions of operating problems, under the chairmanship of **A. G. Seitz** (General Crushed Stone Co.), discussed "In What Respects Should the Quality of Crushed Stone Be Improved?" As this deals more with the marketing of material than with the operation, we include the discussion of it here rather than under that section dealing with operations.

Mr. Rea said in general requirements of specifications for Ohio state highway crushed stone aggregate are based on the following fundamental requirements:

(a) Quality of aggregate itself, that is, soundness, durability, etc.

(b) Size and grading of aggregate.

(c) Cleanliness or freedom from coating.

He emphasized the necessity of fulfilling all three requirements simultaneously.

Physical Properties of Stone From Same Quarry Should Be Recognized

Mr. Rea called attention to the fact that in practically all quarries there is more or less variation in the quality of stone in various parts of the deposit. This applies particularly to sedimentary rocks like limestone and dolomites which are found in different strata. Thus some ledges may be much better stone than others, or one side of the quarry may have better stone than the other side, and while the softer stone may be entirely satisfactory for certain purposes such as base construction of highways, or even for the first course in traffic-bound macadam, it should not be furnished where a hard aggregate is required, such as the covering material for bituminous surfacing or for the wearing course of a traffic-bound macadam road.

In other words, Mr. Rea tried to emphasize the necessity of knowing one's own product and of utilizing it where it was best for the purpose rather than making a heterogeneous mix of it as is so commonly done in many quarry operations.

Grading

Regarding grading, Mr. Rea said that the experience of the state highway department differed, and in some cases the producers furnished almost universally the proper sizes ordered, while with other producers the state highway engineers have a continuous fight to obtain satisfactory gradings. The reason for this, Mr. Rea believes, was in the matter of equipment or proper operation of equipment, and it was obvious it was possible and feasible to produce stone of the required grading when a plant was properly equipped and operated. He also spoke of the tendency of producers to rob their concrete stone of ½- and ¾-in. sizes, especially toward the late summer and fall, when extensive surface work is being carried on.

Segregation in Handling

Mr. Rea cautioned against the segregation of this stone in handling after it left the shipper's bins, which is not often the producer's fault. He said that he considered the proper sizing of aggregates of primary importance, in fact he said in some cases it meant practically the difference between success and failure of the road. He said: "From the standpoint of uniformity, it is of course important whether the material is used for macadam, for covering material or for concrete. In case of concrete it is essential that the aggregate be properly graded, not only from the standpoint of uniformity but also from the standpoint of strength and durability of the concrete itself. Many cases of failure of concrete have been the result of segregated aggregates."

Specification of Several Sizes of Coarse Aggregates Under Consideration

Mr. Rea mentioned that some of the states are now specifying separate sizes of coarse aggregate, and said his own state highway department very seriously considered incorporating a requirement of this kind in its 1930 specifications, but in view of other modifications which were made it had been decided to postpone consideration of this for another year. He said, "I predict that within a few years the proportioning of concrete by using at least two sizes of coarse aggregate will be quite general."

Mr. Rea thought that such specifications would be to the advantage of the stone producers themselves because it would make possible the use of a less proportion of the smaller sizes.

Washing Crushed Stone

Regarding cleanliness or freedom from coating, Mr. Rea had this interesting statement to make in regard to washing crushed stone: "It has been but a few years since the matter of washing crushed stone for construction work was unheard of. This has always been considered one of the problems of the sand and gravel producer. However, within the past few years many stone producers have found it advantageous to put in washing plants. Personally, I may say that I have been really surprised at the big improvement which has been accomplished with the washing of crushed stone in some of the quarries in Ohio. This improvement has been made not only in the concrete stone or stone used for bituminous mixes, but also in surface treatment work—as one of our maintenance engineers told me a few days ago, 'Compared with the results formerly obtained, there is as much difference as between day and night.' He said that he had a chance to compare the results of stone from the same vicinity, which was practically the same as far as quality and composition were concerned, but one had been washed and the other was unwashed, and the difference in results was to him amazing."

Washing Usually Worth While

Mr. Rea said that the question of whether the stone should be washed or not depends entirely upon the quality and character of the stone, quarrying conditions, and the proposed use of the stone. In general, he said, it is the quarries containing at least some soft stone where the greatest improvement is obtained, but even in some cases where the stone is hard but contains clay seams or rock, which results in a sticky or clay-like coating, the washing of the stone had been found worth while.

Referring to the Ohio State Highway Department's laboratory tests of crushed stone to determine quality, size or grading, cleanliness or freedom from coating, Mr. Rea said 33% did not comply strictly with the limit specified, although some showed a slight variation from the specifications and might be considered acceptable.

Concrete Floors for Residences

R. E. Copeland (Portland Cement Association) gave a talk on "Concrete Residence Floors," emphasizing the advantages of concrete for floors in residences because of their permanence, durability and fire-safe qualities, and suggested the possibility of developing a market for aggregates through promotion of this type of residence construction. The address was illustrated by lantern slides showing the various types of floor construction and finishes, and he stated the subject matter of his address is available in pamphlet form, published by the Portland Cement Association, Chicago.

L. C. Bonnell (F. R. Upton, Inc.) discussed the subject of "Importance of Proper Specifications for Crushed Stone," urging the standardization of stone sizes and proper specifications. **A. B. Rodes** (Franklin Limestone Co., Nashville, Tenn.), who led the discussion, emphasized also the importance of transverse strength data in connection with concrete roads.

Stone Sand

M. L. Jacobs (Bethlehem Mines Corp., Bethlehem, Penn.) discussed the subject of "Stone Sand—Its Successful Use and Characteristics." This material has long been one of the specialties of the Bethlehem Mines Corp.'s crushing plants and has been widely advertised in the Pennsylvania construction journals. It is made by a drag classifier without the use of any additional water beyond that used in the regular washing operation.

Mr. Jacobs' paper was illustrated by moving pictures and lantern slides showing the preparation of the material and some concrete road work where it had been used, together with tabulations of tests made.

Mr. Jacobs brought out that in the beginning a large number of tests were made in the company's own laboratory and that these all showed higher concrete strengths where stone sand was used than where the local bank sands were used. These tests were later confirmed by outside commercial testing laboratories.

Pictures were shown of one particular concrete road near one of the Bethlehem Mines Corp.'s plants, about 1½ miles long, in which stone sand was used and which is in excellent condition after several years' service. The company has been very successful in the sale and promotion of washed stone sand at its various plants for use as a concrete fine aggregate and has had no trouble in disposing of all that it could make.

Dr. H. F. Kriege (France Stone Co Laboratories, Toledo, Ohio) contributed a discussion of stone sand by giving some of the France Stone Co.'s experience, which has been quite similar to the Bethlehem Mines Corp.'s and shows that the promotion of stone sand is entirely feasible provided the material itself was right and its properties could be demonstrated, as had been done in these two instances.

Dr. Kriege pointed out that this sand is in size from ¼-in. to 100-mesh, and that 35% to 40% of it is coarser than 8-mesh. He considered the France company's success in furthering the use of stone sand in concrete was due to its coarseness, and that the gradation had an important effect on the final test results.

Advertising

Col. E. J. McMahon (executive secretary, St. Louis Quarrymen's Association, St. Louis) again emphasized, as he has done at previous conventions of the association, the possibilities of doing effective advertising through consistent and persistent use of letters, post cards and bulletins sent direct by mail.

D. W. Saffel (Greer Limestone Co., Morgantown, W. Va.) also gave a very excellent presentation on "Individual Advertising" and showed in detail, with examples, the way in which his company keeps its product before its purchasers and prospective purchasers.

In the discussion following, **C. A. Munson** (New Haven Trap Rock Co., New Haven, Conn.) brought out the importance of consistent and persistent effort in the use of various advertising mediums and particularly by the use of direct-by-mail letters and bulletins.

These subjects will be referred to more in detail in a later issue of Rock Products in connection with the editorial discussion of sales and distribution now current.

Sewage Treatment

Samuel A. Greeley (Pearce, Greeley and Hansen, hydraulic and sanitary engineers, Chicago) in a paper, "A Summary of the Various Types of Sewage Treatment Works with Overall Costs and Comments on Their Application," dealt more with sanitary engineering than with crushed stone. Nevertheless his paper was interesting and helpful in giving operators an idea of how crushed stone was used in sewage treatment works.

Crushed stone is most used in the trickling filter type of sewage treatment, some plants requiring as high as 300,000 tons.

Recent Concrete Road Tests

F. H. Jackson (division of tests, U. S. Bureau of Public Roads) informally presented the recent concrete road tests of the bureau, the results of which have not yet been made public.

Mr. Jackson said the trend of specifications in the various states was evidence that some of the research results of the U. S. Bureau of Public Roads were taking effect. He said in the leaner mixtures of concrete it is the mortar that fails first, while in the richer mixtures as in paving concrete, the coarse aggregates may be the cause of failure. In other words, the use to which concrete is to be put has an important bearing on the quality of coarse aggregate required.

Mr. Jackson agreed with Mr. Goldbeck in not favoring the sodium sulphate test, which does not pass some stone known to be sound. He said the criterion in concrete pavements is now flexural strength and that a variation in the coarse aggregate did have an appreciable effect on flexural strength of concrete in pavements.

Limiting Factors of Coarse Aggregate

Mr. Jackson made it clear that he was making no comparison between different classes of material such as stone and gravel, but comparing the one individual material with another. In other words, two crushed stones may differ as much from one another as stone from gravel and vice versa.

The Bureau of Public Roads is making tests on concrete pavements at Arlington, Va., for the purpose of determining the limiting factor of coarse aggregate, for the purpose of designing concrete with as large a proportion of coarse aggregate as possible. Three separate sizes of coarse aggregate are being used with constant amounts of sand and cement.

Mr. Jackson said that the tendency at the present time is to design concrete for a desired strength and to use concrete of a constant cement content irrespective of the kind of coarse aggregate.

"Designed-Mix" Concrete for Pavements

As an illustration, he quoted from a proposed new specification for "designed-mix" concrete for pavements prepared by the U. S. Bureau of Public Roads, based on these three governing principles:

(1) That flexural strength is the most important strength characteristic of pavement concrete and that a concrete paving mixture should therefore be designed to meet a definite flexural strength requirement rather than a definite crushing strength requirement.

(2) That so many factors affect the flexural strength of concrete that the strength which will be obtained by the use of any given combination of materials cannot be determined by any so-called calculation method, such as the fineness-modulus method, but must be determined by actual trial in the laboratory.

(3) That, *for any given combination of materials*, the flexural as well as the crushing strength of concrete is gov-

erned by the ratio of water to cement in the mix, substantially in accordance with the water-cement ratio law. This fact makes it possible to design concrete paving mixtures by the so-called "water-cement ratio trial-method" as described in *Public Roads* for August, 1928.

These specifications have been sent to the various state highway departments for their suggestions and criticisms.

Factors Effecting Concrete

One of the interesting comments in connection with these specifications is: "It is of course realized that the quality of portland cement used in the concrete may have as great or greater an effect on the concrete as the type of aggregate."

For the quality of coarse aggregates, Mr. Jackson suggests crushed stone with a percentage of wear of not more than 7, gravel with a percentage of wear of not more than 15 and blast-furnace slag weighing not less than 70 lb. per cu. ft.

Air Port Construction

R. H. Simpson (chief engineer, Department of Public Works, Columbus, Ohio) gave an interesting, illustrated talk on the construction of the new municipal air port at Columbus, which is chiefly interesting to crushed stone producers because a very considerable amount of stone was used in the pavement of the runways. A very considerable tonnage of white limestone screenings was used on the landing field itself, increasing its visibility and at the same time giving the soil stability.

Operation of Plants and Production

The national association has a committee on standards, of which **Frank S. Jones** of the General Crushed Stone Co., is chairman. Mr. Jones, reporting for the committee, stated that the committee organization had been changed somewhat during the past five years and its work divided into five sub-committees as follows:

(1) Standardization of commercial sizes of crushed stone.
(2) Standardization of drilling equipment.
(3) Standardization of plant equipment.
(4) Standardization of specifications and the marking of supplies and equipment.
(5) Standardization of quarry equipment.

Each of these sub-committees (with the exception of No. 3) reported at the convention and their reports were published for general distribution.

Drilling Equipment

Albert L. Worthen (Connecticut Quarries Co., Inc., New Haven, Conn.), reporting as chairman of the sub-committee on standardization of drilling equipment, stated that a discussion of the present standards by his committee at a meeting in New York in October indicated that no change was necessary or advisable in respect to the 4½-, 5- or 6-in. well-drill standards. Differences of opinion were expressed as to the standards in use for the 8-in. equipment. After a somewhat lengthy discussion it was recommended that the manufacturers of drilling equipment give the question of 8-in. standards as applied to the quarry industry careful consideration to the end that such revision of the standards for 8-in. equipment be recommended as experience would seem to prove advisable.

No consideration has yet been given to the problem of standardization of drilling equipment other than well drill. The committee has requested manufacturers of other types of drilling equipment to submit such standards as they deem proper for the best interests of the industry.

Sundry Supplies

John Rice, Jr. (General Crushed Stone Co., Easton, Penn.), reporting as chairman of the sub-committee on the standardization of specifications and the marking of supplies and equipment, called attention to the standard specifications for materials obtainable through the Government Printing Office at Washington, D. C., prepared by the Federal Specifications Board of the Department of Commerce, Washington, D. C., and listed the number of such specifications available at the present time, including such commodities as linseed oil, turpentine, brooms, pipe, packing, etc.

Quarry Cars

A. G. Seitz (General Crushed Stone Co., Syracuse, N. Y.), reporting on the sub-committee for standardization of quarry equipment, stated that the work of this committee is intended to cover quarry cars and tracks, and that it had met with very great difficulty in accomplishing anything specific. He said that it would seem that the first approach in the way of meeting the obstacle would be to adopt a standard covering parts of various cars and from the information received by the committee it would seem that this could be accomplished.

He said that the manufacturers have expressed the opinion that they do not wish this committee discontinued, and that something can be accomplished.

Dust Elimination in Product

Fred O. Earnshaw (Carbon Limestone Co., Youngstown, Ohio), chairman, submitted the committee report on the mechanical elimination of dust. The first question he raised was as to what constitutes "dust" in or upon crushed stone, stating that there seemed to be some varied opinion. Apparently in order to constitute dust the material must be 80-mesh or finer. On the other hand the Pennsylvania State Highway specifications for 1929 define dust as passing a 20-mesh sieve. Anything larger than 20-mesh is considered fine aggregate.

It is chiefly in bituminous construction that a dust coating on stone is harmful, according to Mr. Earnshaw.

Dust in the Plant

Regarding the elimination of dust at the plant, Mr. Earnshaw said that part of the dust was that which settles on the stone from the screening and crushing operations, and that this can be partially eliminated by the use of ventilating stacks and fans, which could collect and save the dust otherwise distributed on the landscape. The disadvantage of this is, of course, the installation cost and the fact that it is not 100% effective. Mr. Earnshaw pointed out also that a great deal of the dust on stone as it is delivered to the job is accumulated in transit, especially in dry summer weather.

Regarding washing crushed stone, Mr. Earnshaw stated that in some instances it is necessary to install an extensive scrubbing, immersing and rinsing plant to obtain a uniformly clean aggregate. For the average open-pit quarry (and most limestone mines) the practice of dry screening and sizing of stone first, then subjecting it a thorough rinsing, is adequate.

Washing Practices

This rinsing is accomplished in several ways, one of which is by the use of a revolving screen, preferably an open end screen with a substantial fine mesh wire jacket and a 4-in. pipe suspended in the center the full length of screen. This pipe is perforated with holes of approximately ⅛-in. in diameter, closely spaced and in such position that the spray will, for the most part, strike the stone at the highest point as it follows the circle of the screen.

Another very efficient method, but one perhaps not having as large a capacity as a revolving screen, is the use of a vibrating or shaker screen. The degree of pitch can best be determined for each individual installation. This screen is prayed from a series of pipes with perforated holes, the position of the holes being such as to direct the streams of water against the flow of stone over the screen.

Tendency Towards Washed Material

As one of our largest producers states, the tendency among engineers is toward specifying washed material, and there are so many things in favor of washing against nothing to its disfavor, that we do not believe any other method of preparing stone should be

followed, unless water for washing is entirely lacking.

Washing stone has had the effect in some cases of changing specifications, allowing more of the 1/8- to 3/8-in. size to be incorporated with the coarser aggregates. The consequence has been a reduction in voids, which results in a lower cement factor and cheaper concrete. This helps in our competition with rounded coarse aggregates and is of great benefit to the average producer by lessening the amount of screenings he produces.

Cleaning Costs Very Low

The cost of this method of eliminating dust and coated aggregate has been reported by several of the larger producers as being practically nil.

It is a fact that in some plants the washing of crushed stone, instead of increasing the cost, has actually decreased it, for, regardless of weather or pit conditions, the producer who is equipped to properly wash or rinse his stone, can operate day in and day out and produce a uniform, clean aggregate, avoiding the piling up of orders due to a shutdown of the plant because of weather conditions.

With the present trend of thought among engineers and producers, it appears that the time has arrived when all producers should be seriously considering the best and most efficient methods adaptable to his operating conditions for the elimination of dust.

Vibrating Screens

C. G. Adams (France Stone Co., Toledo, Ohio) discussed "Vibrating Screens." He said that his company, like all the rest of the stone companies, had been experimenting with vibrating screens at different times for several years, but it was not until a year ago that his company attempted to use this type of screen entirely from scalping to finished product, their experience having been mostly for screening smaller sizes of stone.

During the past year the company has made two complete installations of vibrating screens, one of 60 tons per hour and the other of 160 tons per hour in plants having formerly been equipped with three revolving screens and dust jackets.

Power and Maintenance Costs Favor Vibrating Screen

The three rotary screens with jackets required a total of 50 hp. and they were replaced by five double-deck vibrating screens requiring a total of 25 hp., and the vibrating screens have given satisfaction in every way.

He stated the space required to install the vibrating screens as compared with the space required for the revolving screens was very much in favor of the vibrating screens, and that replacement of screens in the vibrating machine required but a noon hour's job for two men, while replacing of a jacket, especially an inner jacket, on the large revolving screens was an all-night or Sunday job for the same two men.

Mr. Adams said "it seemed to be a general feeling among crushed-stone producers and among the screen manufacturers themselves that vibrating screens were more efficient or at least better placed if put on finer sizes such as 1½-in. down, but our experience in the past year has been the opposite, in so far as efficiency is concerned. We found that in screening ½-in. to 1-in. stone all the pieces were so close to the size of the opening a stone might go into several openings before it went through, but in the larger sized openings a certain amount of the material would fall through like water, in the first few feet, leaving the balance of the length of the screen for the finer grading.

Screens With More Than Two Decks Not Advisable

"We found that where possible it is never advisable to use over a two-deck screen, as in the three-deck screen too much of the lower deck is lost, even if a baffle is used, although we have them where we did not have room for more than one screen. We also have found it necessary to use a size smaller opening on the vibrators than was used on the revolving screens, as the stone on these screens has a tendency to push each piece through, which was not the case before, but this is just a matter of adjusting your openings to your demand, which is made easy, especially where screen tests are made every few days, as is the case in our plants."

Screen Adjustments

In answering questions Mr. Adams stated that if specifications called for a 4½-in. stone he had found that a 4-in. opening on a vibrating screen about equals a 4½-in. opening on a revolving screen. He said further that the variation in the angle of a vibrating screen for maximum capacity is very small, probably not over two or three degrees. He said that they had not varied the speed of their vibrating screens for different sizes of materials, but used the same speed throughout, but he admitted that it might be advisable to vary the speed.

Installation Costs

Mr. Adams compared the costs of the two installations as about $20,000 for the three revolving screens with motors and controls, and $9,000 for the five vibrating screens, and he believed that they had a little more capacity in the vibrating screen installation than they had in the revolving screen installation.

Rotary Screens

J. H. Schmidt (North Jersey Quarry Co., Morristown, N. J.) in the absence of **W. R. Sanborn** (Lehigh Stone Co., Kankakee, Ill.), who was scheduled to discuss rotary screens, told of some of the difficulties in getting the correctly sized stone with rotary screens, it requiring considerable juggling to get the proper opening, proper angle and proper capacity which would result in no rejections because of oversize. He favored the square opening as giving the best capacity rather than hexagonal or round openings, and said it was possible to get the correct size of material with the square opening (the proper size of material based on round opening specifications) by using the correct size of square opening. He further emphasized the proper loading of the screen for accurate sizing as irrespective of the size of the holes. Overloading would make a very considerable difference in screen results.

Accident Prevention

H. E. Rodes (Franklin Limestone Co., Nashville, Tenn.), reporting as chairman of the committee on accident prevention, made a plea for some money for a well-financed accident prevention committee whose chief function would be one of education and stimulation of the members to more effective efforts toward accident prevention. He said: "We believe the situation in the crushed-stone industry from the accident prevention standpoint is as follows:

"1. A few members are doing such good work in prevention as to come fairly close to elimination.

"2. Many are doing reasonably good work.

"3. Most members could profitably spend greater efforts and more money in accident prevention.

"4. The reason why most members do not do better is that they do not realize how great the opportunity is or how certain the profits are with the right sort of work. They think they have the picture but they are mistaken.

"5. The industry is paying casualty insurance based largely on the unfavorable experience of non-members. Better safety work by the members will develop a better experience figure that will make lower rates possible.

"The association acting through its committee should be able to:

"1. Collect and present the facts that will persuade every member to improve his accident prevention work to reach a much higher standard.

"2. Collect and present the facts that will lead to lower insurance costs."

Cape Girardeau Quarry Wins Safety Trophy

L. R. Cartwright (Mid-West Rock Products Corp., Indianapolis, Ind.) made a brief address on safety work, and **J. J. Forbes**, representing the United States Bureau of Mines, presented the *Explosives Engineer* safety trophy for 1929 to the Cape Girardeau quarry and crushing plant of the Marquette Cement Manufacturing Co., Cape Girardeau, Mo. The acceptance speech was made by **M. P. Greer** for the Marquette cement company.

J. V. Scott (National Safety Council, Chicago, Ill.) was to deliver a paper on "A Service for Employers in the Crushed Stone Industry," describing the work and scope of the National Safety Council, but owing to the shortness of the time available it was found necessary to submit this paper later in the *Crushed Stone Bulletin.*

Association Affairs and Progress

W. F. Wise (president of the association) in his address touched on the high spots of the history of the association during the past year, and thanked the officers and directors for their co-operation, mentioning that attendance at board and executive committee meetings had been exceptionally good in spite of these having occurred mostly in the busiest part of the operating season.

President Wise mentioned particularly the co-operation of E. G. Lewis, chairman of the Manufacturers' Division, and the splendid work he had done in increasing the membership of the division to 94 through the addition of 19 new member companies.

Work for Standing Committees

During the year the number of standing committees was increased and their work encouraged, and President Wise believes that the results fully justified this method of gathering and disseminating technical data both on uses of the product and on the operating problems of the industry. President Wise further urged the establishment of an active committee on insurance and safety. He said that he considered fire and casualty insurance rates in the crushed-stone industry entirely too high. He also favored the establishment of uniform cost accounting and more co-ordination in purchases of equipment and supplies, suggesting that the purchasing agents of some of the larger companies were in a position to supply through experience many suggestions for the standardization of supplies and equipment which would result in savings to the industry.

Research Should Be Extended

Mr. Wise spoke very strongly in favor of extending the research work of the association, particularly on bituminous macadam materials, stating that in some states no serious competition has been experienced in the markets for these materials, while in materials for others the competition is much more serious. President Wise further touched on the growing competition for other aggregates used in sewage disposal works of the trickling filter type and urged investigation and research along this line.

Engineering Staff Should Be Increased

"It is hoped the day will come," said President Wise, "in the near future, when our association may have several engineers reporting to Mr. Goldbeck, whose duties will be to travel the entire country for the purpose of carrying direct to engineers and owners of projects the results of the investigations of our bureau. Such addition would cost quite a bit, but would assuredly pay handsome returns. During the past, demands on Mr. Goldbeck's time has been such that for out-of-town engagement he was required to express regret frequently, and in some instances accepted with a resultant necessary delay to other important matters. This demand will increase to such an extent within the next two years that a definite policy of assistance to him should be in the making."

More Funds Needed

President Wise made an eloquent plea for more funds for the association, stating that the only way that the association had been able to avoid a deficit of about $7,000 this year was through the pledging of that amount by a few members of the executive committee at their meeting in New York on October 25 last, and he emphasized the overworked condition of the present Washington executive staff and the desirability of increasing it.

Secretary's Office

J. R. Boyd (reporting as secretary and for the treasurer) mentioned the work of the association early in 1929 on behalf of a tariff for crushed stone, and the work in conjunction with the National Sand and Gravel Association and the National Slag Association with the American Railway Association in trying to arrive at some plan to relieve the burdensome expense of producers for cleaning and repairing railroad cars.

The total receipts for the association in 1929 amounted to practically $48,000, of which $33,250 represented dues of active members and $5,112 the dues of associate members. The rest of the income is accredited to miscellaneous sources of income, the largest items of which were contributions to anticipated deficit of nearly $5,000.

Bureau of Engineering

A. T. Goldbeck (reporting as director of the bureau of engineering of the association) divided his activities under ten heads as follows: (1) Directing the research work of the association; (2) publishing articles of benefit to the industry; (3) acting for local groups of producers in matters pertaining to specifications; (4) representing the industry on technical committees; (5) discussions before technical bodies; (6) presentation of papers before various groups; (7) advising individual producers on various problems pertaining to their stone; (8) serving as chairman of program committee for the annual convention and conducting correspondence in connection therewith; (9) writing technical reports on research work done in co-operation with other agencies; (10) general correspondence.

Association Represented on Many Technical Committees

Mr. Goldbeck now represents the association on the following technical committees and organizations: Committee C-9, Concrete and Concrete Aggregates, A. S. T. M.; Committee D-4, Road Materials, A. S. T. M.; Committee E-1, Methods of Testing, A. S. T. M.; Committee 201, Aggregates Committee, A. C. I.; Structural Design of Roads Committee, Highway Research Board; Committee on Non-Metallic Minerals, A. I. M. M. E.; National County Roads Planning Commission; Committee on Subgrades and Pavement Bases, A. R. B. A.; Highway Research Board, National Research Council; Committee on Mineral Aggregates, Highway Research Board.

His work for individual producers included problems of determining the percentage of dust, flat and elongated pieces, soft fragments, quality of stone in new deposits, quality of particular portions of a quarry, proper sizes for different purposes, and numerous other problems.

New Scale of Dues Proposed

Albert L. Worthen (Connecticut Quarries Co., New Haven, Conn.), as chairman of the committee on finance of the association, submitted a new scale of dues ranging from $50 per year for a production up to 50,000 tons to $1,575 for production ranging from 950,000 to 1,000,000 tons a year, based on 2 mills for the first 400,000, 1½ mills for the second 400,000, and 1 mill for 800,000 to 1,600,000 tons, and ¼ mill for production over 1,600,000 tons per year.

This scale was acted upon favorably by the convention, but it is understood that it is not yet ready for immediate adoption by the association.

Association Incorporated

Otho M. Graves (chairman of the committee for the incorporation of the association) reported the details by which the National Crushed Stone Association had become a corporation organized under the laws of the District of Columbia. This involved some changes in the constitution and by-laws which were favorably acted upon at the convention so as to conform with all the legal requirements of transferring the property of the association to the corporation.

Entertainment

As usual, the annual smoker of the Manufacturers' Division was an event enjoyed by all, and at the annual banquet of the association the three speakers, W. B. Burruss, an internationally known business counsellor

of Washington, D. C., George E. MacIlwain, business economist, lecturer, author and analyst, Detroit, Mich., and Captain Irving O'Hay, a soldier of fortune, philosopher and humorist, of New York, all were very interesting and entertaining.

Russell Rarey (vice-president of the Marble Cliff Quarries Co., Columbus, Ohio) was the toastmaster, and the following reception committee of active and associate members deserves congratulations on the splendid manner in which they handled the convention arrangements: B. T. Van Camp, Cincinnati, Ohio, chairman; H. M. Sharp, Toledo, Ohio; Harry Brandon, Piqua, Ohio; William M. Andrews, Youngstown, Ohio; M. B. Garber, Lorain, Ohio; Bruce Shotton, Pittsburgh, Penn.; Abe Goldberg, Milwaukee, Wis.; C. H. Adamson, Aurora, Ill.; R. H. Summer, St. Louis, Mo.; D. R. Watson, Hamilton, Ont., Canada; H. E. Rodes, Nashville, Tenn.

New Officers for 1930

Officers of the association for 1930 besides W. F. Wise, president, are as follows:

The officers for the ensuing year elected at the convention are: President, W. F. Wise; secretary, J. R. Boyd, and Treasurer, F. T. Gucker. Regional vice-presidents are: Canada, C. M. Doolittle; Southwestern, Harry Landa; Eastern, A. S. Lane; Central, Allen Patterson; Northern, W. R. Sanborn; Southern, T. I. Weston.

Directors

Directors were elected as follows: W. M. Andrews, Ohio; H. E. Bair, Ohio; A. J. Blair, Wisconsin; W. M. Boxley, Virginia; C. D. Brewer, Minnesota; L. R. Cartwright, Indiana; O. P. Chamberlain, Illinois; J. E. Cushing, New York; F. O. Earnshaw, Pennsylvania; E. Eikel, Texas; E. E. Evans, Ohio; Otho M. Graves, Pennsylvania; F. T. Gucker, Pennsylvania; J. L. Heimlich, New York; W. E. Hilliard, Connecticut; E. J. Krause, Missouri; A. S. Lane, Massachusetts; Thomas McCroskey, Tennessee; E. J. McMahon, Missouri; A. C. McLaughlin, Illinois; E. U. Ragland, North Carolina; Russell Rarey, Ohio; John Rice, Pennsylvania; H. E. Rodes, Tennessee; James Savage, New York; J. W. Schmidt, Jr., New Jersey; J. F. Schroeder, Iowa; W. L. Sporborg, New York; John W. Stull, Virginia; R. B. Tyler, Kentucky; Mortimer Wandell, New York; T. I. Weston, South Carolina; G. J. Whelan, Ohio; A. L. Worthen, Connecticut; for the Manufacturers' Division, C. G. Lewis, H. M. Davison and Bruce Shotton.

Trade Practice Conference

Practically one whole afternoon's session of the convention was devoted to a discussion of the code of business practices adopted by the board of directors at the Atlantic City meeting in July, and since printed and distributed to the industry.

The principal objection to this code seemed to be on the part of a few members who considered that they were increasing their moral obligations by agreement to live up to a code that they feared could not be strictly adhered to, at least immediately.

This objection was finally overcome by convincing them that there was no necessary signed agreement involved to adhere to the code, and that it was more in the nature of an expression of the right thing to do than a complete agreement to do it, except of course in so far as the rules define actual violations of existing law.

Dumping Provisions Debated

In the Trade Practice Conference of the industry under Judge Edgar A. McCulloch, member of the Federal Trade Commission, on January 23, following the adjournment of the convention proper, the discussion was confined very largely to the provisions aimed at the prevention of dumping. As finally adopted, only one of the original rules covering dumping and the inducement of sales by other products, which is often a means of hiding dumping, survived and this in a rather innocent form. The revised rules as adopted by the Trade Practice Conference are as follows:

Revised Code

Inducing Breach of Contract

Rule 1. Resolved: That the willful interference by any person, firm, corporation or association, by any means or device whatsoever, with any existing contract between a seller and a purchaser, in or about the production, manufacture, transportation, purchase or sale of any product handled by the industry, or with the performance of any contractual duty or service connected therewith, such interference being for the purpose or with the effect of dissipating, destroying or appropriating, in whole or in part, the patronage, property or business of another engaged in such industry, is an unfair trade practice.

Misbranding

Rule 2. Resolved: That the false marking or branding of products of the industry, with the effect of misleading or deceiving purchasers with respect to the quantity, quality, size, grade or substance of the materials purchased, is an unfair trade practice.

Fraud and Misrepresentation

Rule 3. Resolved: That the sale or offering for sale of any product of the industry, accompanied by misrepresentation calculated to deceive customers or prospective customers as to the quantity, quality, size, grade or substance of such product, is an unfair trade practice.

Secret Rebates

Rule 4. Resolved: That the secret prepayment of transportation charges and/or the secret payment or allowances of rebates, refunds, credits, unearned discounts, whether in the form of money or otherwise, or the giving of premiums, or extending to certain purchasers special service or privilege not extended to all purchasers under like terms and conditions, is an unfair trade practice.

Price Discrimination

Rule 5. Resolved: That any discrimination in price between the purchasers of the same class, not including discrimination in price on account of the difference in grade, quality or quantity of the product sold, or which makes only due allowance for difference in cost of selling and transportation or discrimination in price in the same or different communities, made in good faith to meet competition, where the effect of such discrimination may be to substantially lessen competition or tend to create a monopoly, is an unfair trade practice.

Rule 6. Resolved: Freight and trucking charges are necessarily reflected in the price, and the practice on the part of sellers of requiring purchasers in some instances to pay such freight charges and in other instances of assuming such charges, causes discrimination in price; and the failure of the seller to require the purchaser in each instance to pay the charges for freight and trucking is condemned by the industry.

Defamation of Competitor or Disparagement of His Materials

Rule 7. Resolved: That defamation of a competitor by words or acts imputing to him dishonorable conduct, inability to perform contracts, or questionable credit standing, or the false disparagement of the grade or quality of his materials, is an unfair trade practice.

Sales Below Cost

Rule 8. Resolved: That the selling of goods below cost for the purpose of injuring a competitor and/or with the effect of lessening competition, is an unfair trade practice.

Commercial Bribery

Rule 9. Resolved: That the secret paying, or promising to pay, to an employe of a customer or prospective customer, without the knowledge of his employer, of a commission or consideration of any character, for the purpose of inducing or compensating for a sale, is an unfair trade practice.

Rule 10. Resolved: That the offering or giving of commissions, prizes, premiums, gifts or excessive entertainment, to anyone in connection with the sale, purchase or use of any product distributed by manufacturers within the industry, or as an inducement thereto, is condemned by the industry.

Enticement of Employes

Rule 11. Resolved: That the enticement of employes from a competitor for the purpose of interfering with his business, is an unfair trade practice.

Terms of Sale

Rule 12. Resolved: That the industry hereby records its approval of the practice of each individual independently publishing to the purchasing trade his price and terms of sale, and the publishing of fictitious prices to mislead the industry and the public is condemned.

Manufacturers' Division Exposition

An innovation of the Manufacturers' Division exposition this year was the awarding of a loving cup, suitably inscribed, to the exhibitor with the most interesting exhibit. Active members were given cards with 63 numbered squares, each square representing a booth number. As the member visited each booth he was given a sticker to place over a number on the card. When the card was filled, which meant a visit to each exhibit, it was turned in and the member voted his choice of the three exhibits which appealed to him as the most interesting. The exhibit of the General Electric Co. was awarded the loving cup. Bucyrus-Erie and the Woodford Engineering Co. exhibits were given first honorable mention, and the exhibit of Mack-International Truck Corp., second honorable mention.

Prize Contests for Association Members Create Interest

Ten prizes were awarded the active members who turned in complete cards. The winners were: 1st prize, wrist watch won by M. Murray, the John T. Dyer Quarry Co.; 2nd prize, large flask won by B. A. McKinney, West Roxbury Trap Rock Co.; 3rd prize, desk set won by M. M. Boles, Elmhurst Chicago Stone Co.; 4th prize, desk set won by F. H. Edwards, Connecticut Quarries Co., Inc. The remaining prizes of pen and pencil sets were won by H. A. Rowan, the John T. Dyer Quarry Co.; M. Bovee, General Crushed Stone Co.; F. M. Howe, Le Roy Lime and Crushed Stone Co.; L. Karch, J. W. Karch Stone Co.

Best Guessers Rewarded

International Motor Co.'s contest in which about 100 participants attempted to guess the weight of a load of crushed stone in a Mack 6-wheel chassis with quarry body of gross weight, 46,746 lb., chassis and body, 27,050 lb., weight of load 19,696 lb., resulted in a tie for first prize between J. R. Callanan of the Callanan Road Improvement Co., South Bethlehem, N. Y., whose estimate was 19,650 lb., and Frank R. Jones of the General Crushed Stone Co., Easton, Penn., whose estimate was 19,742 lb. Each of these estimates were exactly 46 lb. from correct. Consequently, a coin was tossed to determine the winner and Mr. Callanan won first prize of a golf bag and Mr. Jones the second, a Gladstone bag.

Consolation prizes were won by: Louis Holstein, John T. Dyer Quarry Co., Birdsboro, Penn. (19,639 lb.); H. Williams, General Crushed Stone Co., Boston, Mass. (19,603 lb.); M. A. Blakeslee, New Haven Trap Rock Co., New Haven, Conn (19,600 lb.); C. H. Gaut, American Limestone Co., Mascot, Tenn. (19,754 lb.), and B. A. McKinney, West Roxbury Trap Rock Co., Boston, Mass. (19,800 lb.).

New Officers of the Manufacturers' Division

The annual business meeting of the Manufacturers' Division was held in the form of a dinner meeting on January 21. The following officers and directors were elected: Chairman, H. M. Davison, Harnischfeger Corp., Milwaukee, Wis.; vice-chairmen: Thomas MacLachlan, Vulcan Iron Works, New York City; M. S. Lambert, Robins Conveying Belt Co., Chicago, Ill.; A. E. Reed, the W. S. Tyler Co., Cleveland, Ohio; H. C. Ryder, the Hayward Co., New York City; L. W. Shugg, General Electric Co., Schenectady, N. Y.

New Board of Directors

The new board of directors includes: H. M. Davison, chairman, Harnischfeger Corp., Milwaukee, Wis.; Lucius Beebe, Troco Lubricating Co., Philadelphia, Penn.; Gordon Buchanan, C. G. Buchanan Co., Inc., New York City; H. T. Gracely, Marion Steam Shovel Co., Marion, Ohio; Abe Goldberg, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.; M. S. Lambert, Robins Conveying Belt Co., Chicago, Ill.; Thomas MacLachlan, Vulcan Iron Works, New York City; A. E. Reed, the W. S. Tyler Co., Cleveland, Ohio; C. A. Riggs, Loomis Machine Co., Tiffin, Ohio; H. C. Ryder, the Hayward Co., New York City; S. R. Russell, E. I. du Pont de Nemours and Co., Wilmington, Del.; F. L. Swabb, Heisler Locomotive Works, Erie, Penn; L. W. Shugg, General Electric Co., Schenectady, N. Y.; J. M. Thistlethwaite, Nordberg Manufacturing Co., Milwaukee, Wis.; E. L. Wettloufer, Niagara Concrete Mixer Co., Buffalo, N. Y.; J. M. Wells, Ingersoll-Rand Co., New York City; J. C. Farrell, Easton Car and Construction Co., Easton, Penn.; K. B. Harwood, Mack International Truck Corp., New York City; C. S. Huntington, Link-Belt Co., Chicago, Ill.; C. H. Adamson, Stephens-Adamson Manufacturing Co., Aurora, Ill.

B. G. Shotton, Hendrick Manufacturing Co., Pittsburgh, Penn., was elected representative of the Manufacturers' Division on the board of directors of the National Crushed Stone Association.

New Associate Members and Exhibitors

Through the effective work of E. G. Lewis, retiring chairman of the Manufacturers' Division, 19 new associate members were represented at the convention. Ten of these had exhibits for the first time. They were: Bethlehem Steel Co., the Cleveland Rock Drill Co., the Detachable Bit Corp. of America, Gardner-Denver Co., Linn Manufacturing Corp., McLanahan and Stone Machine Co., the Ohio Power Shovel Co., Ross Screen and Feeder Co., Westinghouse Electric and Manufacturing Co., and the Woodford Engineering Co. A miniature quarry operation featured by electric shovels and a centrally-controlled electric haulage system attracted considerable attention at the machinery exhibit.

Manufacturers' Exhibit

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.—Exhibited photos, pamphlets and conducted a party of delegates through its Norwood, Ohio, plant, where some of the company's new products, including the Newhouse crusher and vibrating screen, were shown. Represented by R. T. Beglinger, J. S. Bond, I. K. Cox, T. E. Fisher, A. Goldberg, W. C. Johnson, W. E. Keine, R. C. Newhouse.

American Manganese Steel Co., Chicago Heights, Ill.—Showed pictures of dipper teeth and manganese steel parts, manganese pan-conveyor, small model of bucket, etc. Represented by J. O. Clark, E. F. Mitchell, A. R. Sittig.

Atlas Powder Co., Wilmington, Del.—This company was represented in its booth by A. D. Hammond and H. White.

Earle C. Bacon, Inc., New York, N. Y.—Showed sectional views and model of the Farrell-Bacon jaw crusher. Represented by W. H. Milroy, W. V. Pietsch and W. R. Young.

Bethlehem Steel Co., Bethlehem, Penn.—Showed full-size rails, steel ties and switch gear and new alloy drill steel. Represented by J. H. Bateman, O. W. Johnson, C. Y. Phillips, J. E. Ross and J. R. Tyson.

Blaw-Knox Co., Pittsburgh, Penn.—Exhibited model derrick and clamshell, photographs and pamphlets. Represented by A. C. Featherstonhaugh.

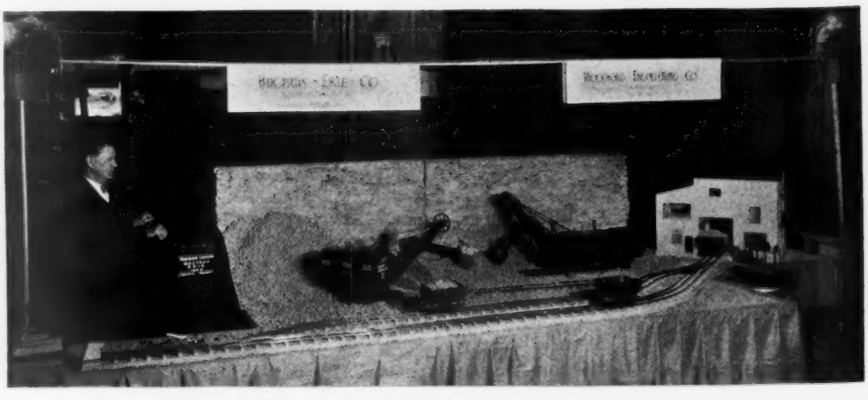
Bucyrus-Erie Co., South Milwaukee, Wis.—Exhibited model quarry face with working models of their 120-B electric shovel operated with standard controls and Woodford centrally controlled electric haulage system. Represented by P. H. Birckhead, R. W. Conant, A. R. Hance, E. G. Lewis, F. C. Ruhloff, S. R. Waller, M. J. Woodhull and F. O. Wyse.

Buffalo Wire Works, Buffalo, N. Y.—Showed samples of steel and galvanized wire cloth of all meshes and gages, and a new alloy steel product "Kok-Tex" applicable to vibrating screens. Represented by W. D. O'Neil.

Burrell Engineering and Construction Co., Chicago, Ill.—Showed photographs. Represented by G. T. Burrell Jr., M. H. Baldwin and M. E. Crosby.

Chicago Pneumatic Tool Co., New York, N. Y.—Exhibited pneumatic drills and drill steel. Represented by C. L. Benedict, R. N. Dold and W. S. Lynch.

Cleveland Rock Drill Co., Cleveland, Ohio—Showed two sinker drills, two types of pavement breakers, a drifter, clay digger, backfill tamper,



A miniature quarry operation featured by electric shovels and a centrally-controlled electric haulage system attracted considerable attention at the machinery exhibit

riveter and caulking tool, together with complete line of rock-drill accessories. Represented by L. E. Oldham and C. L. Seaman.

Cross Engineering Co., Carbondale, Penn.—Exhibited perforated screen plate samples. Represented by W. S. Nicol.

Detachable Bit Corp. of America, New York, N. Y.—Exhibited samples of its detachable bit and drill steel. Represented by T. A. Graves, F. A. Metlam and R. W. Sanders.

E. I. du Pont de Nemours and Co., Wilmington, Del.—Distributed literature on blasting practice and showed samples to illustrate different sizes of dynamite cartridges. Represented by C. H. Coale, H. H. Hamilton, J. W. Koster, A. J. Shoemaker, R. H. Sumner, E. Wolf.

Easton Car and Construction Co., Easton, Penn.—Distributed car and truck-body catalogs and literature, exhibited model of truck body and quarry cars. Represented by J. C. Farrell, G. D. Fraunfelder, J. McC. Latimer, Arthur Prausintz and K. C. Provance.

Fate-Root-Heath Co., Plymouth, Ohio—Displayed panels of photographs of gasoline and Diesel locomotives in stone quarries. Represented by A. E. Ainlay and G. G. Stein.

Frog Switch and Manufacturing Co., Carlisle, Penn.—Exhibited samples of manganese-steel dipper teeth, chains, sheaves, parts of crushers, pulverizers, etc. Represented by H. A. Johann and V. H. Seals.

Gardner-Denver Co., Denver, Colo.—Exhibited pneumatic drills, including a wagon-drill, drill sharpener and panel of pneumatic drill parts. Represented by B. C. Essig.

General Electric Co., Schenectady, N. Y.—Exhibited a model electric railway controlled by telephone and vacuum tube and thyratron photo electric control equipment. Represented by W. E. Gluesing, K. H. Runkle, L. W. Shugg, F. L. Stone.

Good Roads Machinery Co., Kennett Square, Penn.—Showed installation pictures of jaw crushers and models of fine reduction crusher. Represented by E. Brown, Col. J. W. Kemper, J. C. Mainland, E. S. Phillips and R. S. Scott.

Harnischfeger Corp., Milwaukee, Wis.—Displayed a model of its No. 600 P. and H. shovel; also photographs and literature on their line of excavating equipment. Represented by H. M. Davison, L. P. Deephouse, B. E. Onkst, C. F. Thompson and C. S. Thompson.

The Hayward Co., New York, N. Y.—Showed moving pictures of the various applications of their dragline, clamshell and orange-peel buckets, also models of the same. Represented by H. C. Ryder and C. S. Sargent.

Heisler Locomotive Works, Erie, Penn.—Exhibited model of their geared locomotive; also literature. Represented by F. L. Swabb.

Hendrick Manufacturing Co., Carbondale, Penn.—Displayed their Weston testing screen for samples of stone or sand down to ¼-in. Also perforated screen plates for vibrating screens and flat plates and grating. Represented by D. W. Blackburn, B. G. Dann, B. G. Shotton.

Hercules Powder Co., Wilmington, Del.—Displayed copies of the *Explosives Engineer*, booklets on quarry blasting and "Hercomite." Represented by M. R. Budd, W. J. Austin, J. Barab, W. F. Gainty, N. S. Greensfelder, S. A. Johnson, R. Keane and W. B. Lyon.

Ingersoll-Rand Co., New York, N. Y.—Exhibited wagon drill, also literature on drifter drills, jackhammers, compressors and pumps. Represented by W. Broan, A. H. Hruby and J. M. Wells.

Kennedy-Van Saun Manufacturing and Engineering Co., New York, N. Y.—Exhibited a small motor driven gearless gyratory crusher for fine crushing. Also literature of the crushing equipment. Represented by A. W. Hamilton, E. N. Kunkle, S. C. Seiple.

Kensington Steel Co., Chicago, Ill. — Displayed manganese steel castings of breaker plates, sprockets with renewable teeth, buckets, car wheels, etc. Represented by E. C. Bauer and W. Ellis.

Keystone Driller Co., Beaver Falls, Penn.—Displayed catalogs and literature on their blast hole drills. Represented by W. Elmes.

Keystone Lubricating Co., Philadelphia, Penn.—Exhibited their automatic lubricating system, also their pneumatic electric system and line of grease cups. Represented by H. M. Ludwick.

Koppel Industrial Car and Equipment Co., Koppel, Penn.—Displayed several panels showing dump cars of all types used in the rock products industry. Also literature on new quarry car and track equipment. Represented by C. Abels, F. D. Campbell, H. W. Redman and W. W. Stewart.

Link-Belt Co., Chicago, Ill. — Exhibited their Sykes herringbone speed reducer, heavy duty type anti-friction idler, also standard idler, samples of chain and a working model of their vibrating screen. Panels of photographs showed their cranes, shovels, screens, conveyors, etc. Represented by C. S. Huntington, B. H. MacNeal, W. W. McKee, J. Richards and A. K. Schiffin.

Linn Mfg. Co., Morris, N. Y.—Displayed moving pictures of the Linn tractor in various kinds of operating work. Also literature and catalogs. Represented by M. N. Bridges and B. F. Lease.

Loomis Machine Co., Tiffin, Ohio—Displayed photographs of their "Clipper" blast hole drill. Represented by J. Reynard, C. A. Riggs and E. E. Winship.

McLanahan and Stone Machine Co., Hollidaysburg, Penn.—Exhibited a working model of their new roll crusher, the design of which is radically different from the usual crusher of this type. Also showed a working model of their new double deck shaking screen and working model of their latest design log washer. Represented by W. McLanahan, C. McLanahan and G. E. Krider.

Mack-International Truck Corp., Philadelphia, Penn.—Showed moving pictures of their six-wheel dump trucks operating in the quarries of Bethlehem Mines Corp. and General Crushed Stone Co. Also photographs of their trucks and locomotives. Represented by F. Barnitz, K. B. Harwood, M. C. Horine, W. B. Jupp and E. M. Post.

Manganese Steel Forge Co., Philadelphia, Penn.—Exhibited all sizes of "Rol-man" double lock-mesh, woven manganese steel screens. Also samples of fine mesh double crimped screen. Represented by W. H. Potter and J. H. McKinley.

Marion Steam Shovel Co., Marion, Ohio.—Displayed photographs and literature of Marion shovels in quarry work. As usual, the guessing contest conducted by this company attracted considerable attention. A worn and a new dipper tooth were displayed. The worn tooth had been digging limestone for one season and crushed stone producers were asked to guess the number of tons that had been dug. The correct answer was 130,000 tons. First prize, a wrist watch, was won by E. W. McCall, Tarbox-McCall Stone Co., with a guess of 125,680 tons. Second prize, a traveling bag, was won by T. C. Cooke, Lynn Sand and Stone Co., who guessed 125,550 tons. Third prize, a traveling bag, was won by T. J. Beam, Sunbeam Quarries Co. His guess was 134,600 tons. Fourth prize, a traveling kit, was won by W. J. Adams, Cushing Stone Co. His guess was 136,000 tons. Fifth prize, a scarf, was won by J. L. Heimlich, LeRoy Lime and Crushed Stone Corp. His guess was 123,333 tons. The Marion company was represented by F. E. Artz, D. L. Cheney, J. P. Courtwright, J. B. Crew, H. T. Gracely, C. M. Howser, F. Rulford, C. E. Silva, J. H. Watters and E. R. Wilson.

National Crushed Stone Association, Washington, D. C.—Displayed illuminated photographic panels of the various uses of crushed stone in road construction work and for use as railroad ballast. Also views of the research laboratory of the association. Represented by J. R. Boyd, A. T. Goldbeck and J. E. Gray.

National Malleable and Steel Castings Co., Cleveland, Ohio—Displayed samples of "Naco" cast steel shovel and dragline chain, also car links. Represented by L. L. McKee and R. R. Root.

National Safety Council, Chicago, Ill.—Displayed panels of bulletins showing the work they are doing to promote safety in industry. Represented by J. V. Scott.

Niagara Concrete Mixer Co., Buffalo, N. Y.—Exhibited a cross section of a scalping screen and a cross section of a sizing screen. Also miscellaneous parts of their screens and bearings. Represented by E. L. Wettlauffer, F. J. Morrissey, J. S. Morrison, C. R. Ingersoll, A. E. Owen and S. C. Hodge.

Nordberg Mfg. Co., Milwaukee, Wis.—Displayed photographs and drawings showing the working principle and design of the Symons disc and cone crusher. Represented by A. C. Colby, L. D. Hudson, L. D. Hudson, Jr., and C. B. Watrous.

Ohio Power Shovel Co., Lima, Ohio—Displayed photographs of the "Lima 101" 1¼-yd. gasoline, electric and diesel, shovel, dragline, crane and drag shovel. The exhibit emphasized the fact that the machine is equipped throughout with anti-friction bearings. Represented by H. F. Barnhart and R. K. Wills.

Osgood Co., Marion, Ohio—Displayed photographs and literature of their shovels, cranes and draglines. Represented by C. R. Peterson and E. C. Smith.

Pit and Quarry, Chicago, Ill.—Displayed copies of current issues of their publication. Represented by A. J. Hoskin, V. E. Larsen, S. A. Phillips and W. E. Trauffer.

Robins Conveying Belt Co., New York, N. Y.—Exhibited their double deck "Gyrex" screen model 42-72 assembled with a Texrope drive. Also a 30-in., demountable troughing idler, Style 203D and 203XR, which is anti-bearing equipped. Also their rubber cushioned troughing idler and their "Squeegee Rubber Belt Cleaner." Catalogs and photographs were also displayed. Represented by R. H. Dana and M. S. Lambert.

Rock Products, Chicago, Ill.—Displayed copies of the new "Directory of the Rock Products Industry," which contains information on the producing plants arranged geographically, with maps showing location of plants and a complete Buyers' Guide of the manufacturers of machinery used in the field. Also displayed copies of the current Annual Review Number. Represented by G. M. Earnshaw, E. C. Harsh, W. B. Lenhart, Nathan C. Rockwood and Ralph C. Sullivan.

Ross Screen and Feeder Co., New York, N. Y.—Exhibited working models of the Ross chain feeder, screen feeder and grizzley feeder. Also sections of their large chain and photographs of installations in stone plants. Represented by W. Ross and E. Webster.

Sanderson-Cyclone Drill Co., Orrville, Ohio—Displayed and distributed their general catalog, "Big Blast Hole Drills" and an interesting bulletin titled, "Drilling for Air Docks." Represented by W. F. Nothacker.

Sauerman Bros., Inc., Chicago, Ill. — Displayed model of their dragline and slackline cableway system. Represented by F. A. Pement and G. H. Tompkins.

Simplicity Engineering Co., Durand, Mich.—Exhibited a working model of their double deck gyrating screen. Also literature and photographs. Represented by F. D. Barber and G. W. Behnke.

Orville Simpson Co., Cincinnati, Ohio—Used four booths to exhibit three full-size Rotex screens. The larger of these was a No. 61, a single screen surface machine 4x8 ft. Another was a No. 46 single screen surface 3x7 ft. The third machine was a No. 46 with cut-away drive head, to show the compensating balancing system. Also displayed dimensional and detailed drawings. A new bulletin, "Rotex Screens for Quarries, Mines, Pits and Mine Products," was distributed. Represented by A. Crain, L. Simpson and R. O. Simpson.

Stearns Conveyor Co., Cleveland, Ohio—Displayed various sizes of their anti-friction "Rex-Stearns," chilled face cast iron idlers. Also samples of elevator and transmission chain. Represented by G. M. Dyke and G. E. Mahoney.

Stephens-Adamson Manufacturing Co., Aurora, Ill.—This exhibit featured their new "Vibrator" screen. Sections and photographs showed several unique features, including a new rapid acting clamp for screen panels, grid support and a suspension mounting to minimize vibration transmitted to buildings. Their "Simplex" belt conveyor carrier, "J. F. S." variable speed reducer and boxcar loader were also shown. Represented by C. H. Adamson, E. J. Patton and T. A. Ruddy.

Taylor-Wharton Iron and Steel Co., High Bridge, N. J.—A revolving display rack containing this company's "Tisco" products featured this exhibit. Pulverizer hammers, gears, wear plates, chain, sheaves, dipper teeth, screen cloth, elevator buckets, jaw plates, concaves and miscellaneous manganese steel parts were displayed. Represented by C. B. Andrews, L. E. MacFadgen, I. A. Taylor, Jr., and J. A. Trainor.

Thew Shovel Co., Lorain, Ohio—Displayed photographs and literature covering their line of shovels, cranes, draglines and back diggers. Represented by M. B. Garber and T. F. Hendson.

Traylor Engineering and Manufacturing Co., Allentown, Penn.—Displayed catalogs and bulletins covering their heavy duty crushing rolls, Bulldog gyratory crusher, Blake type jaw crusher, Bulldog finishing gyratory crusher and Bulldog jaw crusher. Represented by D. A. Cheyette, B. Haislip and O. E. Thaleg.

Traylor Vibrator Co., Denver, Colo. — Exhibited their new vibrator dewatering conveyor used for washing sized crushed stone, gravel, coal, etc. Represented by Paul Wigton.

Troco Lubricating Co., Philadelphia, Penn.—Displayed samples of "Troco" crusher grease. Also literature. Represented by Lucius Beebe.

The W. S. Tyler Co., Cleveland, Ohio—Exhibited a 4x6 ft. type 60 "Hum-mer" screen, heavy duty type. This screen has increased power in its vibrator mechanism. Also showed several panels of photos of typical installations. Also exhibited two sets of test sieves ranging from 200 mesh to 1 in. Represented by C. T. Bingham, H. F. Peirson and J. L. Wright.

Union Explosives Co., Clarksburg, W. Va.—Displayed samples of ingredients and cartridges. Also blasting supplies. Represented by H. E. Ashcraft, H. H. Conley and A. H. Edgerton.

U. S. Bureau of Mines, Washington, D. C.—Displayed several panels showing a series of bulletins on the outstanding suggestions for reducing the second major cause of accidents in quarries and open pits, "Explosives." Represented by J. J. Forbes, S. R. Howell, A. A. Munsch and I. R. Thoenen.

U. S. Bureau of Public Roads, Washington, D. C.—Panels and charts showing various phases of the work of the bureau made up this exhibit. Represented by F. H. Jackson.

Vulcan Iron Works, Wilkes-Barre, Penn.—Displayed panels of photographs of this company's line of steam and gas locomotives. Also distributed literature. Represented by T. MacLachlan and J. F. O'Brien.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn.—Exhibited their Type A reversing drum controller and a grid glow tube. Also literature on their line of electrical and electrical control equipment for the crushed-stone industry. Represented by I. E. Borland, E. N. Fabrizio, B. Lester, L. H. Selleg and G. E. Stoltz.

Williams Patent Crusher and Pulverizer Co., St. Louis, Mo.—Exhibited a working model of their pusher type hammer crusher and feeder. Also distributed literature. Represented by H. Bond.

Woodford Engineering Co., Chicago, Ill. — This company had a joint exhibit with Bucyrus-Erie

Co., in which the Woodford haulage system cars in operation were displayed. Represented by L. M. Harper, G. Schroeder and H. E. Woodford.

Associate Members Other Than Exhibitors Who Registered

American Steel and Wire Co.—A. C. Jones.
American Tar Products Co.—W. E. Crowell.
Armstrong Manufacturing Co.—E. A. Dyer and H. C. Neely.
C. G. Buchanan Co., Inc.—G. Buchanan and G. W. Flounders.
Ensign-Bickford Co.—S. S. Ellsworth.
Gill Rock Drill Co.—F. A. Gill.
Illinois Powder Mfg. Co.—A. H. Bassler, R. T. Collins, G. Garden, M. S. Kincaid and C. W. Swanson.
Keith-Dunham Co. — F. M. Hunter and J. P. Thomas.
Texas Co.—P. C. Tennant.
Trojan Powder Co.—A. D. Hughes and H. B. Srodes.

Guests

Burton Explosives Sales Co.—J. S. Burton, Cleveland, Ohio.
Canadian Industries, Ltd.—F. J. Hallford, Toronto, Ont.
Lima Power and Shovel Co.—M. K. Tate, Lima, Ohio.
United States Rubber Co.—E. C. Ree.

Registration

Active Members

Acme Limestone Co.
A. W. McThenia, Alderson, W. Va.
American Limestone Co.
Charles H. Gaut, Mascot, Tenn.
Beam, Inc., C. C.
C. C. Beam, Melvin, Ohio.
P. F. Beam, Reesville, Ohio.
H. H. Brandon, Piqua, Ohio.
W. V. Custis, Wilmington, Ohio.
Bethlehem Mines Corp.
M. L. Jacobs, Bethlehem, Penn.
Boscobel Granite Quarries Co.
W. T. Moulton, Jr., Richmond, Va.
Boxley and Co., W. W.
L. J. Boxley, Roanoke, Va.
A. W. Lumsden, Pembroke, Va.
Buffalo Crushed Stone Co.
Thomas L. Cove, Buffalo, N. Y.
A. J. Hooker, Buffalo, N. Y.
A. S. Savage, Buffalo, N. Y.
James Savage, Buffalo, N. Y.
Callanan Road Improvement Co.
B. R. Babcock, South Bethlehem, N. Y.
J. R. Callanan, South Bethlehem, N. Y.
Keith M. Callanan, Albany, N. Y.
John Kawaske, South Bethlehem, N. Y.
Canada Crushed Stone Corp., Ltd.
J. Stephens, Hamilton, Ont., Can.
D. Roy Watson, Hamilton, Ont., Can.
Carbon Limestone Co.
Fred O. Earnshaw, Youngstown, Ohio.
P. E. Heim, Youngstown, Ohio.
J. H. Jackson, Youngstown, Ohio.
Casper Stolle Quarry and Contracting Co.
Carl A. Stolle, East St. Louis, Ill.
J. E. Weber, East St. Louis, Ill.
Cedar Bluff Quarry
W. C. Sparks, Princeton, Ky.
Cerulean Stone Co.
A. M. Andrew, Cerulean, Ky.
Columbia Quarry Co.
William Kieffer, St. Louis, Mo.
C. E. Klaus, Columbia, Ill.
E. J. Krause, St. Louis, Mo.
H. C. Krause, St. Louis, Mo.
Connecticut Quarries Co., Inc.
R. D. Brewer, New Haven, Conn.
John DeSandre, Meriden, Conn.
Fred H. Edwards, New Haven, Conn.
E. T. Nettleton, New Haven, Conn.
William F. Quinn, New Haven, Conn.
M. E. Reid, New Haven, Conn.
Robert S. Rose, New Haven, Conn.
A. L. Worthen, New Haven, Conn.
Consumers Material Corp.
W. B. Carswell, Kansas City, Mo.
H. T. Jackson, Kansas City, Mo.
C. A. Shouse, Kansas City, Mo.
Cushing Stone Co., Inc.
W. J. Adams, Schenectady, N. Y.
J. C. Cushing, Schenectady, N. Y.
J. E. Cushing, Schenectady, N. Y.
Dittlinger Lime Co.
E. Eikel, New Braunfels, Tex.
Dolomite Products Co.
Harvey N. Clark, Rochester, N. Y.
J. H. Odenbach, Rochester, N. Y.
Dufferin Paving and Crushed Stone, Ltd.
W. T. McRae, Toronto, Ont., Can.
R. M. Scrivener, Toronto, Ont., Can.
Dyer Quarry Co., John T.
H. H. Eschelman, Norristown, Penn
Frank Evans, Norristown, Penn.
F. T. Gucker, Norristown, Penn.
A. H. Gumpert, Norristown, Penn.
Ed. Hahn, Norristown, Penn.
Lewis J. Holstein, Norristown, Penn.
C. E. Keinard, Norristown, Penn.
William A. Kelley, Norristown, Penn.
R. F. Millard, Norristown, Penn.
Maurice Murray, Norristown, Penn.
Nick Phillips, Norristown, Penn.
W. B. Pritchett, Norristown, Penn.
Henry A. Rowan, Norristown, Penn.
Harry Schwartz, Norristown, Penn.
E. G. Souders, Norristown, Penn.
Eastern Rock Products, Inc.
Elmer Earl, Oriskany Falls, N. Y.
L. B. Gray, Utica, N. Y.
A. S. Owens, Utica, N. Y.
Elmhurst-Chicago Stone Co.
M. M. Bates, Elmhurst, Ill.
G. F. Hammerschmidt, Elmhurst, Ill.
Eyermann Contracting Co.
W. J. Eyermann, St. Louis, Mo.
A. H. Schmatz, St. Louis, Mo.
France Stone Co.
C. G. Adams, Toledo, Ohio.
H. E. Bair, Toledo, Ohio.
A. E. Crumm, Toledo, Ohio.
H. H. Davis, Mansfield, Ohio.
H. F. Kriege, Toledo, Ohio.
Leo Poorman, Toledo, Ohio.
Franklin Limestone Co.
A. B. Rodes, Nashville, Tenn.
H. E. Rodes, Nashville, Tenn.
H. O. Olson, Nashville, Tenn.
Gager Lime Manufacturing Co.
J. M. Gager, Chattanooga, Tenn.
General Crushed Stone Co.
H. B. Allen, Philadelphia, Penn.
A. G. Barres, Easton, Penn.
Meredith Bovee, Syracuse, N. Y.
H. R. Cox, Watertown, N. Y.
L. M. Croll, Phelps, N. Y.
Oliver C. Dietschler, Akron, N. Y.
E. E. Dotter, Quakertown, Penn.
E. W. Faylor, Glen Mills, Penn.
G. W. Faylor, Port Deposit, Md.
O. M. Graves, Easton, Penn.
J. D. Hawthorne, Akron, N. Y.
D. C. Hickey, Syracuse, N. Y.
W. J. Hinds, Syracuse, N. Y.
P. H. Jacoby, White Haven, Penn.
Frank S. Jones, Easton, Penn.
T. A. Lanagan, Winchester, Mass.
M. V. McKeon, Winchester, Mass.
F. F. McLaughlin, Syracuse, N. Y.
Grover J. Murphy, Little Falls, N. Y.
F. C. Owens, Syracuse, N. Y.
L. H. Putmann, Watertown, N. Y.
B. P. Rex, Easton, Penn.
John Rice, Easton, Penn.
John Rice, Jr., Easton, Penn.
George E. Schaefer, Rochester, N. Y.
A. L. Scott, LeRoy, N. Y.
Coulter Scott, Cazenovia, N. Y.
A. G. Seitz, Syracuse, N. Y.
W. J. Weiman, Auburn, N. Y.
H. F. Yotter, Easton, Penn.
Genesee Stone Products Corp.
F. T. Bibb, Batavia, N. Y.
C. L. Buchholtz, Batavia, N. Y.
A. B. Caldwell, Batavia, N. Y.
Gopher Stone Co.
E. C. Lemieux, Minneapolis, Minn.
Greenfield-Massachusetts Broken Stone Co.
H. O. Robinson, Greenfield, Mass.
Lawrence Robinson, Greenfield, Mass.
Greer Limestone Co.
D. W. Saffel, Morgantown, W. Va.
Grove City Limestone Co.
R. H. Albright, Grove City, Penn.
Hagersville Contracting Co., Ltd.
G. R. Gilbertson, Hagersville, Ont., Can.
Hartford Sand and Stone Co.
J. H. Cooke, Hartford, Conn.
C. H. Latham, West Hartford, Conn.
Illinois Electric Limestone Co.
Fred C. Murphy, St. Louis, Mo.
Karch Stone Co., John W.
George E. Karch, Celina, Ohio.
Lisle Karch, Celina, Ohio.
Paul A. Karch, Celina, Ohio.
J. C. Sink, Celina, Ohio.
Kelley Island Lime and Transport Co.
E. J. Buehl, Cleveland, Ohio.
C. Taylor, Cleveland, Ohio.
Kentucky Consolidated Stone Co.
C. W. Lovell, Louisville, Ky.
Kentucky-Virginia Stone Co.
W. B. Paynter, Middlesboro, Ky.
Lake Erie Limestone Co.
W. M. Andrews, Youngstown, Ohio.
Lambertville Trap Rock Co.
J. G. Brennan, Lambertville, N. J.
Landa Rock Products Co.
C. Westbrook, New Braunfels, Tex.
Lane & Son, Inc., John S.
A. S. Lane, Springfield, Mass.
Ralph M. Robinson, Meriden, Conn.
Lehigh Stone Co.
M. Edgeworth, Kankakee, Ill.
LeRoy Lime and Crushed Stone Corp.
J. L. Heimlich, LeRoy, N. Y.
F. M. Howe, LeRoy, N. Y.
Liberty Lime and Stone Co.
John W. Stull, Rocky Point, Va.
Linwood Cement Co.
J. F. Schroeder, Davenport, Iowa.
Louisville Cement Co.
Downey M. Gray, Louisville, Ky.
Lynn Sand and Stone Co.
T. C. Cooke, Swampscott, Mass.
W. D. Manchester, Swampscott, Mass.
Marble Cliff Quarries Co.
E. Q. Davis, Columbus, Ohio.
J. H. Jones, Athens, Ohio.
W. H. Margraf, Columbus, Ohio.
Russell Rarey, Columbus, Ohio.
Marquette Cement Mfg. Co.
E. M. Gould, Cape Girardeau, Mo.
M. P. Greer, Cape Girardeau, Mo.
Material Service Corp.
Irving Crown, Chicago, Ill.
George W. Lenzie, Chicago, Ill.
Meshberger Bros. Stone Co.
Harry Meshberger, Linn Grove, Ind.
Mid-West Rock Products Corp.
L. R. Cartwright, Indianapolis, Ind.
W. L. Miller, Greencastle, Ind.
John Munson, Greencastle, Ind.
E. B. Taylor, Indianapolis, Ind.
Monarch Stone Co.
E. H. Weerts, Tulsa, Okla.
Monon Crushed Stone Co.
Mrs. G. M. Evans, Lafayette, Ind.
National Crushed Stone Association
J. R. Boyd, Washington, D. C.
Beulah Davies, Washington, D. C.
A. T. Goldbeck, Washington, D. C.
Doris E. Hadlow, Washington, D. C.
J. E. Gray, Washington, D. C.
Ruth E. Shauck, Washington, D. C.
National Lime and Stone Co.
C. G. Knoblauch, Findlay, Ohio.
Allen Patterson, Findlay, Ohio.
F. R. Patterson, Findlay, Ohio.
R. G. Spencer, Findlay, Ohio.
National Rock Asphalt Co.
R. B. Tyler, Louisville, Ky.
New Braunfels Limestone Co.
Max A. Altgelt, New Braunfels, Tex.
New Castle Lime and Stone Co.
Ellwood Gilbert, New Castle, Penn.
New Haven Trap Rock Co.
M. G. Blakeslee, New Haven, Conn.
William E. Hilliard, New Haven, Conn.
C. A. Munson, New Haven, Conn.
Edw. T. Perry, Providence, R. I.
New York Trap Rock Corp.
John Gilchrist, Newburgh, N. Y.
E. L. Heidenreich, Jr., Newburgh, N. Y.
P. J. Kelleher, Verplanck, N. Y.
Henry Kohl, Newburgh, N. Y.
W. S. McHenry, Haverstraw, N. Y.
L. F. Miller, Haverstraw, N. Y.
W. S. Miller, Tomkins Cove, N. Y.
C. L. Petzel, Newburgh, N. Y.
J. Q. Taylor, Stoneco, N. Y.
Greer Tomlins, Haverstraw, N. Y.
North Jersey Quarry Co.
F. W. Schmidt, Jr., Morristown, N. J.
John H. Schmidt, Morristown, N. J.
I. W. Wortman, Morristown, N. J.
Ohio Marble Co.
Mrs. A. A. Hall, Piqua, Ohio.
A. A. Hall, Piqua, Ohio.
W. E. Stone, Piqua, Ohio.
L. E. Townsend, Piqua, Ohio.
Old Colony Crushed Stone Co.
E. R. Atwood, Quincy, Mass.
H. A. Johnston, Quincy, Mass.
Olive Hill Limestone Co.
J. H. Mobley, Olive Hill, Ky.
Orange Quarry Co.
J. J. Crawley, West Orange, N. J.
L. W. Kirkpatrick, West Orange, N. J.
Penn Limestone and Cement Co.
John A. Hipple, Rheems, Penn.
Pilot Knob Ore Co.
James C. Travilla, St. Louis, Mo.
Pounding Mill Quarry Corp.
C. M. Hunter, Pounding Mill, Va.
C. M. Hunter, Jr., Pounding Mill, Va.
Reinhold & Co., Inc.
P. B. Reinhold, Pittsburgh, Penn.
Rock Hill Quarries
H. E. Billman, St. Louis, Mo.
Saluda Crushed Stone Co.
W. H. Cook, Greenville, S. C.
Kally Dokoff, Carter, Ky.
Solvay Sales Corp.
J. H. Kaiser, Syracuse, N. Y.
Southwest Stone Co.
W. F. Wise, Dallas, Tex.
Sunbeam Quarries Co.
J. B. Beam, Clermont, Ky.
T. J. Beam, Clermont, Ky.
Tarbox-McCall Stone Co.
E. W. McCall, Findlay, Ohio.
Mrs. J. A. McCall, Findlay, Ohio.
Trap Rock Co.
John Wunder, Minneapolis, Minn.
Trumbower Co., Inc.
William J. Santee, Nazareth, Penn.
Union Limestone Co.
W. W. Duff, New Castle, Penn.
Upton, Inc., F. R.
L. C. Bonnell, Newark, N. J.
Van Camp Stone Co.
B. T. Van Camp, Cincinnati, Ohio.
Weston and Brooker Co.
T. I. Weston, Columbia, S. C.
W. S. Weston, Columbia, S. C.

West Roxbury Trap Rock Co.
Frank J. Long, Boston, Mass.
Bernard A. McKinney, Boston, Mass.
Whitehouse Stone Co.
E. E. Evans, Toledo, Ohio.
Wickwire-Spencer Steel Co.
W. E. Foote, Gasport, N. Y.
Wood County Stone and Construction Co.
W. W. Browning, Bowling Green, Ohio.
York Valley Lime and Stone Co.
Fred W. Cramer, York, Penn.

Guests

American Hoist and Derrick Co.
William M. Schoen, St. Paul, Minn.
Anna Stone Co.
A. A. North, Anna, Ill.
Brandies Machinery and Supply Co.
O. J. Kirschner, Louisville, Ky.
Buckeye Machine Co.
W. H. Gillette, Lima, Ohio.
Cincinnati Quarries Co.
James R. Davidson, Cincinnati, Ohio.
Cincinnati Steel Casting Co.
P. B. Kennedy, Cincinnati, Ohio.
Colgan Limestone Products Co.
P. R. Langel, Columbus, Ohio.
Commercial Stone Co.
A. R. Chambers, Pittsburgh, Penn.
Dolomite, Inc.
W. H. Cameron, Cleveland, Ohio.
C. O. Gallagher, Cleveland, Ohio.
Essex Prison Quarry
W. H. Geisel, Jr., Caldwell, N. J.
Federal Trade Commission
George McCastle, Washington, D. C.
France Stone Co.
A. L. Allen, Mansfield, Ohio.
Jointa Lime Co.
H. J. Russell, Glens Falls, N. Y.
Kelley and Son, Frank
R. F. Kelley, Fostoria, Ohio.
Michigan Limestone and Chemical Co.
U. G. Farber, Buffalo, N. Y.
Ohio Crushed Stone Association
C. L. Clark, Columbus, Ohio.
William B. Guitteau.
Pettibone-Mulliken Co.
J. W. Meckenstock, Chicago, Ill.
Pittsburgh Limestone Co.
J. W. Dinsmore, New Castle, Penn.
R. E. Larry, New Castle, Penn.
St. Louis Quarrymen's Association
E. J. McMahon, St. Louis, Mo.
Sullivan Machinery Co.
D. B. Martin, Cleveland, Ohio.
U. S. Bureau of Mines
I. I. Forbes, Pittsburgh, Penn.
Spencer R. Howell, Pittsburgh, Penn.
Albert A. Munch, Pittsburgh, Penn.
J. R. Thoenen, Washington, D. C.
U. S. Bureau of Public Roads
F. H. Jackson, Washington, D. C.
U. S. Bureau of Standards
R. L. Lockwood, Washington, D. C.

Sales of Slate in 1929

THE value of the slate sold at the quarries of the United States in 1929 was $10,868,000, according to estimates furnished by producers to the United States Bureau of Mines, Department of Commerce. This was 5% less than the value reported for 1928.

The roofing slate sold in 1929, estimated at 441,000 squares, valued at $4,630,000, decreased 9% in quantity and 14% in value over 1928. This represents a decrease of 70 cents in the average value per square. This decrease was largely in the New York-Vermont district, where the estimated sales amounted to 148,500 squares, valued at $2,044,000, a decrease of 19% in quantity. The sales of roofing slate in Pennsylvania was estimated at 243,000 squares, valued at $1,950,000, a decrease of 5% in quantity. There was an increase in sales of Virginia and Maine roofing slates.

The total sales of mill stock in 1929, estimated at 9,200,000 sq. ft., valued at $3,521,000, a slight decrease in quantity and an increase of 3% in value. Mill stock for structural slate—2,768,000 sq. ft., valued at $1,110,000—increased 9% in quantity and 7% in value. Electrical slate—1,424,000 sq. ft., valued at $1,140,000—increased 10% in quantity and 11% in value. Slate for school slates—1,620,000 pieces (865,000 sq. ft.), valued at $20,000—increased 2% in quantity but decreased 11% in value. Mill stock for blackboards and bulletin boards—3,415,000 sq. ft., valued at $1,041,000—decreased 8% in and 3.5% in value in 1929. Slate for billiard-table tops—248,000 sq. ft., valued at $89,000—decreased 15% in quantity and 19% in value. Slate for vaults and covers—480,000 sq. ft., valued at $121,000—decreased 10% in quantity and 12% in value.

There was apparently a considerable increase in the quantity of slate sold for flagging, cross-walks, stepping-stones, etc. This was estimated at 1,317,000 sq. ft., valued at $187,000 in 1929, compared with 932,110 sq. ft., valued at $184,184 in 1928.

The sales of crushed slate for roofing granules and flour in 1929 was estimated at 430,000 short tons, valued at $2,530,000. This represents an increase of 4% in quantity and 2% in value.

Permanent Committee to Encourage Building Activities

A PERMANENT committee to encourage building activities, in support of President Hoover's business stability program, is being organized by the construction and allied industries. This action was authorized at a national building conference held at Washington recently, attended by more than one hundred representatives of the various industries interested in the construction field.

The building conference was held as a part of the movement now under way by the National Business Survey Conference looking to a stabilization of business following the stock market decline. It was called by Julius H. Barnes, chairman of the business survey conference, at the request of trade associations within the construction and building field.

Fenton B. Turck, Jr., vice-president of the American Radiator Co., New York, was named chairman of the permanent committee, and Homer S. Sackett, director of the Home Modernization Bureau of the National Building Industries, Chicago, was appointed secretary. The committee, which it is expected will be completed shortly, will be composed of representatives of the key industries.

Secretary of Commerce R. P. Lamont told the meeting that more than seven billion dollars will be expended by federal, state and local governments and major industrial groups in construction and replacements in 1930. The conference voted to recommend to the various industries represented that a fund of half a million dollars be raised for group advertising and promotion, independent of individual advertising.

Georgia Quarry Reopened

WORK has been started by the Sandersville railroad in extending a side track from its main line to the lime rock lands of the Atlantic Lime Rock Corp. at Tennille, Ga. More than two miles of this track, which is being built jointly by the Sandersville road and the Georgia and Florida railroad, has been completed. The Atlantic company, composed of Pembroke Polk, W. S. Pretorius and D. E. Bird, which was recently chartered, has a capitalization of $30,000, and they plan to install equipment with a capacity of 20 carloads of crushed stone daily.—*Macon* (Ga.) *Telegraph.*

Stone Produced by Illinois Convict Labor May Be Sold

CRUSHED stone and limestone prepared for building purposes by prison labor at the quarry at Joliet, Ill., may be sold to private individuals and firms at the best advantage to the state, according to a ruling of Attorney General Oscar Carlstrom.

The opinion was given to Rodney Brandon, director of the department of public welfare, who had been informed by Warden Hill that in the making of crushed stone at that institution for state highways some of the by-products were pulverized limestone and small sized stone which are adapted to finer concrete work.

In his ruling the attorney general held that such by-products formed a surplus which the board of prison industries may dispose of under the statutory regulations.—*Joliet* (Ill.) *News.*

Canadian Rock Products Gain in Production in 1929

DURING 1929 new records were established in the Canadian output of asbestos, cement, clay products, copper, gold, gypsum, lime, nickel, petroleum, salt, stone, sand and gravel, zinc and in the value of natural gas. The total increase in the value of the mineral output in 1929 over 1928 was $28,887,000.

Non-metallics other than coal, petroleum, etc., had a value of $21,205,000 as against $18,826,692 in the preceding year. The gain in this section was 12.6%, or $2,378,000. Structural materials, including brick, tile, cement, limestone, sand and gravel, valued at $55,228,600 as compared with $49,737,181 in 1928, showed a gain of 11%, or $5,491,000.

New Explosives Company

BURTON EXPLOSIVES Sales, Inc., Cleveland, Ohio, has been recently organized for the manufacture and sales of industrial explosives. J. S. Burton, president of the new company was formerly president of the Grasselli Powder Co. M. S. Kincaid, 922 Guardian Bldg., Cleveland, is to be sales representative for the company.

Albany Gravel to Build Plant at Croton, N. Y.

A. E. OTTAVIANO, INC., Croton, N. Y., has leased to the Albany Gravel Co., Albany, N. Y., for a number of years the privilege of excavating sand and gravel on the former Francis Larkin property on Lower Riverside avenue, Croton. The Albany company will erect a sand and gravel plant there, which, when completed, will employ between 30 and 40 men.

The property adjoins the property owned by the Baroness De Graffenried and operated as a sand and gravel bank by the Croton Sand and Gravel Corp. Reinforced concrete sewer pipes and concrete posts will be manufactured at the new plant, with washed sand and gravel as other products.

R. C. Delaney of Albany will be the manager of the new plant.—*Ossining* (N. Y.) *Citizen.*

Monolith Portland Completes Extensive Improvements

AT the annual meeting of the stockholders of the Monolith Portland Cement Co., Coy Burnett, president, told stockholders that a new "glory hole" method of mining limestone at the company's plant in Kern County, Calif., has been developed and that operation by this method will materially decrease production costs. With one exception, this is the only such method used on the Pacific Coast.

The "glory hole" was not placed in operation until late in 1929 and its effect was not reflected in full until this year. It is estimated that the cost of operations will be cut approximately $140,000 a year by this method.

Since its purchase by Monolith in 1919, the entire plant has undergone a steady program of improvement and has been almost completely rebuilt and modernized. The latest improvement in operations is the rebuilding of the kilns. The rebuilding, while reducing activity for a short time, eventually will add substantially to the capacity of the plant, is was said. It is expected that when completed, these improvements on kilns will effect a saving of around $240,000 a year. Not only will these changes bring about a reduction in production costs, but they will have a favorable effect on future profits, it was pointed out.

Mr. Burnett said he expected conditions to improve in 1930 and that prospects indicate a fairly good year. Increased volume of business and better prices are expected. It was pointed out that per barrel prices of cement were raised in certain territories within the last week, and that competitive conditions seem to be improving.

The company has just made arrangements under contract with the Southern California Gas Co. to supply the Monolith plant with Kettleman Hills natural gas. This will be placed in use February 1 and will result in increased efficiency for cement manufacture.

Natural increases in the use of cement are anticipated. In addition, tremendous demands of new dam and flood control projects are likely to call for a large extra-normal output within the next several years.

The final audited figures covering the operations of the company for the year 1929 are not as yet available. However, a preliminary report was made by the treasurer, wherein the ratio of current assets against current liabilities was shown to be approximately 3 to 1. Bond interest was earned nearly three times, after ample provision for depreciation, etc. After providing for preferred and common dividends for 1929, the report showed a small surplus brought forward to 1930.

The board of directors was increased from five to seven members and is composed of the following: Coy Burnett, J. J. Calkins, Mrs. I. M. Jameson, Harold B. Reed, W. D. Burnett, Alfred F. Smith and Carroll A. Low.

Monolith Portland Cement Co., on the basis of the report to stockholders, encountered adverse factors both with changing of its plant and competitive conditions which disturbed the company's operations in the latter half of 1929. Such conditions are seasonal, however, and a clearer picture of the company's growth may be obtained from the record of earnings.—Pacific Coast edition, *Wall Street Journal.*

Atlantic Gypsum Adds New Product

THROUGH an affiliation with the Wood-Fibre Corp., the Atlantic Gypsum Products Co., Portsmouth, N. H., now adds an insulating board and lath to its line of related building products.

This new board, "Arborite," is made of spruce and kindred soft woods highest in insulating value and strength, and offers high unit insulation, light weight, strength and the durability that goes with a raw material that takes scores of years to mature.

Arborite, manufactured at Lisbon Falls, Maine, is the only insulating board and lath made in New England or in the Atlantic seaboard territory, thus insuring prompt delivery and service. The fact that a rigid insulating board is made in New England is indicative of the fact that this section of the country is keeping pace with the demand for more insulation.

German Quarry Owners Visit Rock Products

TWO RECENT visitors to ROCK PRODUCTS were Hans Leimbach, operator of a trap rock quarry at Schweinfurt, A.M., and Edward Karsch, an electrical engineer, Gera, Germany. These gentlemen are spending several months in the United States visiting quarry operations from coast to coast.

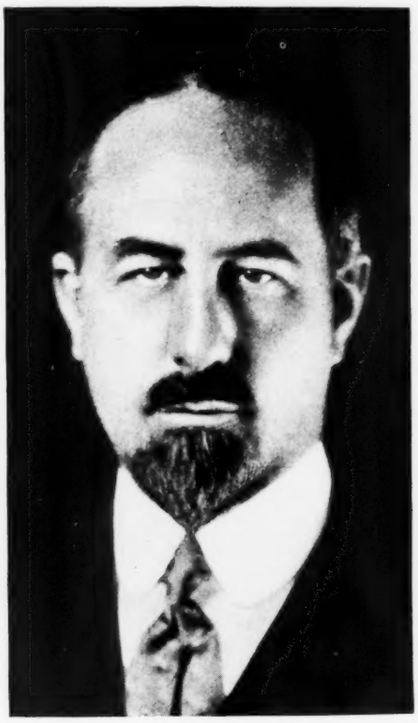
No Cement Price Increase Expected at Knoxville

OFFICIALS of the Volunteer Portland Cement Co., Knoxville, Tenn., stated recently that they had no information of the 50% increase in cement prices over the Southeast which were reported at Nashville.

The Volunteer company is selling cement at $2.55 in Knoxville, which reflects an increase made in December of 36 cents per bbl., or about 16%, F. C. Parsons, sales manager, said.—*Knoxville* (Tenn.) *Sentinel.*

J. V. N. Dorr Honored

JOHN VON NOSTRAND DORR, prominent metallurgical engineer and president of The Dorr Co., engineers, New York, has been awarded the James Douglas medal of the American Institute of Mining and Metallurgical Engineers in recognition, according to the citation, "of his invention of apparatus and achievement in developing and improving hydrometallurgical practice." This medal, awarded annually for distinguished service in no-ferrous metallurgy, will be presented formally at the annual convention of the Institute in New York in February, 1930.



John V. N. Dorr

In 1916 Mr. Dorr was the recipient of the John Scott medal of the Franklin Institute.

Mr. Dorr is already well known in the rock products industry through the use of Dorr slurry mixers, classifiers for sand and gravel, and it is safe to say that he will be much better known in the next year or so when the method of closed circuit grinding, developed by him, becomes more widely used in the cement industry.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Ready-Mixed Concrete Service at San Francisco

Transit System as Developed by the Golden Gate-Atlas Materials Co.

By R. E. Tremoureaux
Consulting Engineer, San Francisco, Calif.

THE GOLDEN Gate Building Materials Co. and the Atlas Mortar Co., two of the largest building material companies in San Francisco, were consolidated several years ago, the new company being the Golden Gate-Atlas Materials Co. In 1927 it was decided to enter into the sale and delivery of mixed concrete and gradually there was built up a fleet of 16 trucks with Barrymore mixers. For the remainder of 1927 and practically all of 1928 the concrete sold by the company was delivered and mixed in Barrymore mixers; in 1928 approximately 90,000 yd. was delivered by this method.

The "Transit Mixers" now in use by the company were operated in Seattle for several years before their use became general. At the present time the Transit mixers are in use in many cities in the United States and their use in foreign countries is being developed. The company installed six Transit mixers in November and December of 1928, added five more in April and May, 1929, and four in September and October, 1929. At the present time 15 Transit mixers and four Barrymore mixers are operated. All the Transit mixers installed replaced the Barrymore mixers, originally in use.

Type and Operating Methods

There have been many improvements made by the Transit Mixer Corp. in conjunction with the operations by the Golden Gate-Atlas Materials Co. The arrangement of the blades and drive and variations in diameter and lengths of the mixers were some of the more important developments.

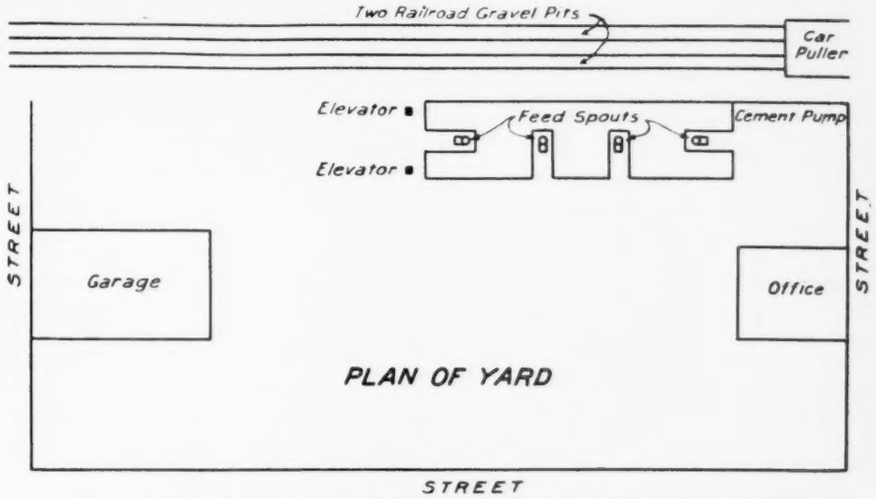
The Transit mixer in use by this company is 5 ft. 6 in. in dia. with a total length of 8 ft. The length of the cone is 3 ft. and the diameter of the opening is 1 ft. 4 in. The mixer does not have water tanks mounted on the mixer, but it is intended eventually to install small tanks for convenience in adding water at the job when it is necessary. The mixers are all mounted on Model No. 52 White trucks, with six-wheel attachments on solid tires. The company is experimenting now with pneumatics and has one truck in the fleet mounted on eight pneumatic tires. In the near future a mixer will be installed on a Fageol truck with 10 pneumatic tires and four-wheel drive. The state law in California limits the load to 34,000 lb. on six wheels and as the 4 cu. yd. of concrete which is hauled in the mixers weighs 16,000 lb., it is necessary to keep the equipment weight within 18,000 lb. As the mixer and hoist weighs 6500 lb., it is necessary that the truck chassis does not exceed 11,500 lb.

The aggregate, cement and water, are weighed and measured into the mixer at the central weighing plant. The load is calculated to produce 4 yd. of concrete in place. The mixer is air-tight when the door is closed and considerable pressure is built up in the mixer as it revolves en route to the jobs. The opening of the gate at the job is always accompanied by the blowing off of this pressure which has been built up. There have not been any particular comments in regard to this, but in my opinion it is a favorable feature in the mixing of concrete.

The engineers in San Francisco generally allow one hour from the time that the concrete is placed in the truck until it is emptied, provided that the truck is revolved a considerable portion of this time. It is seldom that it is necessary to wait one hour before dumping, but this does happen at times when there is unavoidable congestion. The average mixing time from the batching bunkers to the job is 15 minutes.

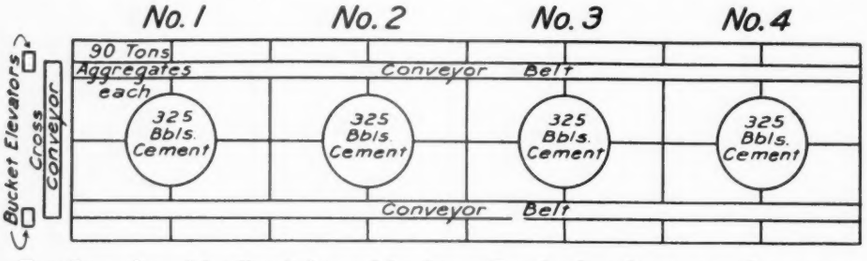
Bunkers

The company leased a block of property at 16th and Harrison streets in San Francisco 400 ft. long by 124 ft. wide. The bunkers, garage and office occupy one-half of this lot, the remaining portion of this



Ground plan of yard operated by the Golden Gate-Atlas Materials Co., San Francisco

property proving valuable because of the necessity of finding space to wash the Barrymore and Transit mixers. The washings from these mixers must be kept out of the city sewers due to the cement content and since they must be washed out after each day's work, this operation presents many problems. Washing the trucks in a portable tank which could be elevated and dumped into a truck for disposal at some other location is now being considered. It is not economically possible to wash the trucks at any other location than at the bunkers due to the lost time that would be necessary.



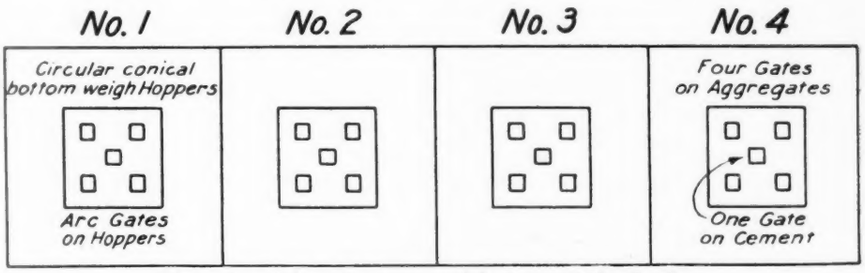
Top floor plan of loading belts and bunkers. Two bucket elevators and two conveyor belts are for the aggregates and a pneumatic pump is used for the cement

The bunkers were built with four weighing scale hoppers and will service four trucks at one time. Each weigh hopper is fed by four aggregate compartments and by a circular cement hopper with a conical bottom located in the central part of the aggregate compartments, the cement hopper forming the inside wall of the aggregate compartments. Each one of the four cement tanks holds 325 bbl. of cement and these tanks are filled from bulk cement cars by a Fuller-Kinyon pump. Each aggregate compartment holds 90 tons, 360 tons for each weighing scale and in the four units the capacity of the bunkers is 1440 tons of aggregate. The sad part of any arrangement and a necessary evil where various mixes are being combined is that all of this tonnage is not available. One aggregate will be exhausted from one of the compartments and the other compartments still have a considerable tonnage remaining. The actual operative capacity in these bunkers is less than 50%; in other words, as soon as each scale has weighed out approximately 100 cu. yd. of concrete or 400 cu. yd. for the bunkers, the refilling of these bunkers must take place. It was found that it will be necessary to duplicate the elevating equipment in order to double the feed to the bunkers, because with all trucks pulling out of the bunkers the elevating equipment cannot supply them. The only method possible is to depend on car storage and car deliveries and large elevating equipment due to the fact that bunker storage of a capacity capable of handling a large operation would be too expensive; ground storage would increase handling costs.

The weighing hoppers have passed through a period of evolution due to the handling of Barrymore mixers, dry batched aggregates and Transit mixers. During this period of transition from the Barrymores to the Transits it was necessary to keep the runway clear and the problems presented were difficult to solve. When the first Transit mixer was installed it was decided to add the aggregates, cement and water directly to the mixer at the plant. The main reasons for the elimination of the water tanks on the mixers were that the mixing at the job was a delay and also that there is a tendency to rush the mixing when the water is added at the job.

Water meters were installed for the measurement of the water, the first meter registering in gallons. The company is now contemplating the purchase of meters that will register in pounds instead of gallons and will have an electric stop for water control.

One of the most difficult problems that have not been satisfactorily solved is the problem of obtaining moisture contents in the aggregates quickly enough to have this effect the control of water to maintain the proper water cement ratio.



Plan of weighing hoppers and bottom of the bunkers

Weigh Hoppers

The weigh hoppers cannot be made large enough due to the elevations in the plant. It is necessary to make two weighs to one batch of 4 cu. yd. An attempt is being made to make the weighs and load the mixer in a three-minute cycle. The average time now is approximately four minutes. All of the weigh hoppers are circular steel with conical bottoms, this type being found to be more satisfactory than the square hopper. At one time an attempt was made to have a charge weighed ahead for the mixer, but due to the difficulty of moving a batch after adding the cement this had to be discontinued. As soon as the cement is added to the dry aggregates it is necessary to move the batch directly into the mixer with very little building up in the spout from the weigh hopper. The gate in the weigh hopper should be small enough so that the feed through the spout is just the amount that the mixer will take. The scales used by this company are single-beamed with dial end point attachments. I believe there is some advantage in the four beam vertical scale.

The largest yardage poured by this company was approximately 18,000 cu. yd. in 25 working days, all of this through the one bunker location. The Transit mixers all averaged over 1000 cu. yd. each per month and one mixer handled 1400 cu. yd. Some dry batched aggregates were handled and in all 700 sixty-ton cars were put through.

Hoppers at Jobs

It is necessary to have at least a 5 cu. yd. hopper conveniently located at the job in order to properly service the mixer. The schedule of trucks is very important and two men are kept on the outside servicing the jobs, scheduling trucks, signing tags and in general expediting of the delivery. The service has been so excellent on many of the very large jobs that the company has been called the "Taxicab" concrete company.

Conclusions

In the writer's opinion the delivery of concrete in Transit mixers, 4 cu. yd. to the load, water added at the plant with concrete being mixed in transit, is as economical and efficient as any operation can be considering all present types of mixers and where the maximum weight load is 34,000 lb.

There no doubt will be improvement in Transit mixers and there may be a further evolution in the manufacture and delivery of concrete, but at the present writing and for our conditions the above is warranted.

The growth of any business depends on service and quality. The company was unable to properly service jobs when hauling a 2¼-cu. yd. load, but the change to the 4 cu. yd. mixers has practically doubled its ability to serve with the same number of trucks and improve the quality of the products.

The Transit mixers have demonstrated that concrete can be delivered at a saving to the contractor and a profit to the operators.

The principal officers of the Golden Gate-Atlas Materials Co. are Charles M. Cadman, president, and C. Stephens, general manager.

Three Large Michigan Sand Companies in Merger

MERGER OF three Michigan sand companies, including the West Michigan Sand and Fuel Co. of Muskegon, the Manistee Sand and Dock Co. of Manistee, and the Port Crescent Sand and Fuel Co. of Port Crescent into a new corporation with a capital of more than $2,000,000 was announced recently.

The new company will be known as the Sand Products Corp. and will have its main offices at Detroit. Articles of association have been filed with the secretary of state at Lansing providing for an authorized capital of 15,000 shares of no par value common stock and $1,500,000 in preferred stock.

Of the total, 5,000 shares of no par stock have been issued in exchange for stock of the three companies which have properties valued in excess of $1,000,000. Officers of the new company are: President, Max B. McKee of Detroit; vice-presidents, Mark T. McKee of Detroit, and A. R. Merrick of Saginaw; secretary, C. F. Nugent of Muskegon, and treasurer, A. N. Farmer of Cleveland. J. L. Sensibar of Chicago, and Fritz L. Meeske of Muskegon complete the board of directors.

The purpose of the merger is to effect operating economies in better co-ordinated operation on Lakes Michigan and Huron. Port Crescent is on Lake Huron in the thumb district and Manistee and Muskegon are centrally located on the east shore of Lake Michigan.

Transportation of pig iron, coal or some other bulk product into Muskegon so that freighters may carry loads both ways is now being considered by the company and an option has been taken on a Muskegon lake dock with a frontage of about 400 ft., but a commercial dock may be built.—*Chicago Journal of Commerce.*

Hat Island Gravel Deposits to Be Developed

PURCHASE by the Puget Sound Tug and Barge Co., Seattle, Wash., of nearly three-fourths of the total acreage of Hat Island, approximately five miles west of Everett in Puget Sound, was announced recently. The company is now drilling test holes and plans to develop on a large scale the gravel deposits of the island, offering a closer source of supply for construction operations, particularly in Seattle.

The purchase, covering about 264 acres, was made from Dr. L. J. Mitchell of London and Monte Carlo, owner of extensive interests in Everett. The principal gravel bed is in a cliff 300 ft. high at the water's edge, the upper 100 ft. being all gravel. The topography of the island is such that these deposits are easily accessible.

The company is considering using the hull of the old motorship *Boobyall,* which it purchased recently as a breakwater, at the point where gravel is to be loaded on barges. The hull would be filled with gravel and partly submerged.

If all work progresses satisfactorily, operations on the island will begin late in February or the first part of March. Gravel bins were reported under construction.

Success of the company's plans to operate these gravel pits will mean competition with the Steilacoom pits, at present supplying nearly all the Puget Sound region.—*Seattle* (Wash.) *Journal of Commerce.*

New Gravel Plant at Barberton, O.

CONSTRUCTION of a new $40,000 plant for the preparation of sand and gravel has been started by Stuver Bros., Barberton, Ohio, on the site of the washing plant formerly owned by O. C. Barber, according to T. J. Stuver, secretary and treasurer of the company. The site is just north of the city corporation line. There an area of 14 acres is under lease for sand and gravel purposes.

The plant will be a modern, 750 cu. yd. per day operation. Five concrete bins will be built, each to contain a different size of sand or gravel.

Later, a spur track will be built to the plant to provide for shipment of sand and gravel out of the city by rail. The plant will begin to operate about April 1.—*Barberton* (Ohio) *Herald.*

S. P. Armsby New Service Director, Haden Lime Co.

SIDNEY P. Armsby has been named service director of the Haden Lime Co., Houston, Tex., and will supervise all research and process developments, educational promotional work and other technical service to customers.

Mr. Armsby is a chemist, a graduate of Pennsylvania State College, 1910, and has had a wide and varied experience with many branches of chemical endeavor. For a short time in 1919 he was connected with the agricultural and chemical department of the National Lime Association and incidentally served as secretary of the A.S.T.M. lime committee. In 1921 he joined the Dittlinger Lime Co., New Braunfels, Tex., as chemical engineer, interesting himself in the varied phases of sales promotion, technical service and process development. Among the process developments in which he assisted is that of the production of a high-grade chemical lime hydrate and a patented procedure (Dittlinger process for plastic finishing limes, Rock Products, September 17, 1927) for the production and control of plasticity in high calcium hydrates which are otherwise non-plastic.

American Concrete Institute Meets at New Orleans

THE 26th annual convention of the American Concrete Institute is to be held at the Roosevelt Hotel in New Orleans, La., February 11, 12 and 13, 1930. An excellent program has been arranged, some of the features following:

2:00 P. M., Tuesday, February 11

Construction Specifications for Concrete Work on Ordinary Buildings—Report of Committee 502, A. R. Lord, chairman.

Concreting Methods at Chute a Caron Dam—I. E. Burks, concrete technician, Alcoa Power Co.

Specification for Centrally Mixed Concrete, reported by Committee 504, Miles N. Clair, chairman.

Design and Operation of Central Mixing Plants, report of Committee 602, Frank I. Ginsberg, chairman.

8:00 P. M., Tuesday, February 11

Methods of Curing Concrete, by H. F. Gonnerman, manager research laboratory, Portland Cement Association.

Winter Concreting Methods, reported by Committee 604, R. C. Johnson, author-chairman.

Variations in Standard Portland Cements. A discussion of report from Committee 202, P. H. Bates, author-chairman.

Preliminary Studies of High Pressure Steam-Curing in the Manufacture of Concrete Masonry Units, by P. M. Woodworth, assistant engineer, research laboratory, Portland Cement Association. Discussion by Ray C. Kiser, manager Crume Brick Co., Dayton, Ohio.

CONCRETE PRODUCTS

9:30 a.m., Wednesday, February 12

A Study of Volume Changes in Concrete Masonry Walls (preliminary results of an important investigation), by W. D. M. Allan, manager Cement Products Bureau, Portland Cement Association.

Recommended Practice for the Manufacture of Standard Concrete Masonry Units—a preliminary study by Committee 708, P. M. Woodworth, chairman.

Recommended Practice for the Use of Cast Stone, reported by Committee 704, Louis A. Falco, chairman.

Color in Concrete Products, Raymond Wilson, author-chairman Committee 703.

Plant Design for Single or Multiple Shift Operation, Benjamin Wilk, author-chairman Committee 707.

Wednesday Afternoon, February 12

Mississippi river excursion on S.S. *Capital.*

8 P. M., Wednesday, February 12

The Reinforced Concrete Column Investigation—(Its possible influence on design) by Committee 105, W. A. Slater, chairman.

Economics of Tall Building Design, reported by R. R. Zipprodt, author-chairman Committee 405.

Deflections of Reinforced Concrete Members, a program report by T. D. Mylrea, author-chairman, Committee 307.

Good Practice in Finishing Floors, reported by Committee 802, Portland Cement Floor Finish, John G. Ahlers, chairman. Discussion by W. E. Hart, secretary of the committee.

1:30 P. M., Thursday, February 13

Business of the Institute (including installation of new officers and directors).

The President's Address, by E. D. Boyer.

Design and Construction of the Bonnet Carre Spillway, by Capt. Helmer Swenholt, Corps of Engineers, U. S. A.

Making and Placing Concrete Revetment Mat, by Lieut. Morris W. Gilland, Corps of Engineers, U. S. A.

The Design of Gulf Short Protection Structures, by J. B. Converse, consulting engineer, Mobile, Ala.

Cementing Oil Wells, by J. E. Hough, Portland Cement Association.

7 P. M., Thursday, February 13

Annual Dinner.

Presentation of Medals.

Entertainment.

Not a Diesel Engine

THE new 4-cylinder engine recently developed by the Novo Engine Co. (described in Rock Products, January 4 issue) is strictly a gasoline engine and not a Diesel, the text under the illustration being in error. The Novo company wants it understood that they do not manufacture Diesels.

The Rock Products Market

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N. J.	.48	.48	1.15	1.25	1.40	.....
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.25	1.15	1.75	.....	1.75	1.75
Buffalo, N. Y.	1.00	1.05	1.05	1.05	1.05	.....
Erie, Penn.	.75	.95	.....	.....	.....	.....
Milton, N. H.	.....	.....	1.75	.....	1.25	1.00
Montoursville, Penn.	1.00	.70	.50	.50	.50	.50
South Portland, Me.	.....	1.00	2.25	.....	.....	2.00
Washington, D. C.	.55	.55	1.20	1.20	1.00–1.20	1.00
CENTRAL:						
Appleton, Minn.	.....	.50	1.25	.....	1.50	.....
Attica, Ind.			All sizes .75–.85			
Barton, Wis.	.....	.40d	.50d	.60d	.60d	.60d
Beloit, Wis. (f)	.60	.30	.30	.40	.40	.40
Des Moines, Iowa	.40– .60	.60– .80	1.50–1.70	1.50–1.70	1.50–1.70	1.50–1.70
Dresden, Ohio	.....	.60– .70	.....	.70– .80	.70– .80	.....
Eau Claire, Wis.	.55	.55	.70	1.00	1.00	.....
Elkhart Lake and Glenbeulah, Wis.	.50	.50	.60	.60	.60	.60
Grand Rapids, Mich.	.50	.50	.80	.80	.80	.70
Hamilton, Ohio	.90-1.20	.90–1.20	.90–1.20	.90–1.20	.90–1.20	.90–1.20
Hersey, Mich.	.....	.50	.....	.50	.70	.70
Humboldt, Iowa	.40	.40	1.25	1.25	1.25	1.25
Indianapolis, Ind.	.50– .75	.40– .60	.50– .75	.50– .75	.60– .85	.60– .85
Kansas City, Mo.	.70	.70	.....	.....	.....	.....
Mankato, Minn. (b)	.55	.45	1.25	1.25	1.25	.....
Mason City, Iowa	.....	.40– .50	1.25	1.25	1.00–1.20	1.00–1.20
Milwaukee, Wis.	.91	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn. (a)	.35	.35	1.35	1.35	1.35	1.25
St. Paul, Minn. (e)	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.75	.75	.75	.75
Waukesha, Wis.	.....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.00	1.00
SOUTHERN:						
Brewster, Fla.	.40	.40	.....	.....	.....	.....
Charleston, W. Va.	.70	1.25	1.25	.....	.....	.....
Eustis, Fla.	.....	.40– .50	.....	.....	.....	.....
Fort Worth, Texas	.75	.75	.90	1.00	1.00	1.10
Knoxville, Tenn.	.70–1.00	1.20	.....	.....	1.20	1.20
Roseland, La.	.30	.30	.80	.80	.80	.....
WESTERN:						
Los Angeles, Calif.	.10– .40	.10– .40	.20– .90	.50– .90	.50– .90	.50– .90
Oregon City, Ore			All grades range from 1.00 to 1.50 per cu. yd.			
Phoenix, Ariz. (c)	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.70	.60	.....	1.25	.....	1.15
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*	1.10*	1.25*

*Cubic yd. ‡Delivered on job by truck. (a) Per yd., delivered by truck, ¼-in. down, 1.25; 2-in. and less, 2.40. (b) ¼- to ¾-in., 1.25. (c) 60-70% crusher boulders. (d) Plus 15c for wintre loading. (e) Prices f.o.b. cars N. P. Ry. (f) Algonquin, Ill., district 5c per ton higher.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.75	2.75	2.75	.....	.....	3.75	.....
Cheshire, Mass.		Sand for soap, 7.00–8.00				6.00–8.00	.....
Dresden, Ohio	1.50–1.75	1.25–1.50	1.50	.....	1.50	.....	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	2.50–3.00	.....
Elco, Ill.		Soft amorphous silica, 92%–99% thru 325 mesh, 18.00–40.00 per ton					
Franklin, Penn.	1.75	1.75	.....	.....	.....	.....	.....
Kasota, Minn.	.....	.....	.....	.....	.....	.....	1.00
Montoursville, Penn.	.....	.....	.....	1.35–1.50	.....	.....	.....
New Lexington, Ohio	2.25	2.00	.....	.....	.....	.....	.....
Ohlton, Ohio	1.75	1.75	.....	2.00	1.75	1.75	.....
Ottawa, Ill.	1.25–3.25	2.25–3.50	1.25–3.25	1.25–3.25	1.25	3.50	3.50
Red Wing, Minn. (a)	.....	.....	.....	.....	1.50	3.00	1.50
San Francisco, Calif.	3.50†	5.00†	3.50†	2.50–3.50†	5.00†	3.50–5.00†	.....
Silica, Mendota, Va.				Potters' flint, 8.00–14.00			

†Fresh water washed, steam dried. (a) Filter sand, 3.00.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio	.....	1.50
Eau Claire, Wis.	4.30	1.00
Franklin, Penn.	.....	1.75
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25–3.25	1.25
Red Wing, Minn.	.....	1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.	.....	1.75

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. plant.

Cheshire, Mass., in carload lots	5.00–7.00
Franklin, Penn.	2.25
Klondike, Mo.	2.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
San Francisco, Calif.	4.00–5.00
Silica and Mendota, Va.	2.50–3.00

Bank Run Sand and Gravel

Prices given are per ton, f.o.b. producing plant or nearest shipping point.

Appleton, Minn.†	.55
Beloit, Wis.¶ (½-in. and less)	.40
Brewster, Fla.†	.40
Burnside, Conn. (sand, ¼-in. and less)	.75*
Chicago, Ill.†	.92–1.20
Des Moines, Ia. (sand and gravel mix)	.60–1.05
Fort Worth, Tex.¶ (2-in. and less)	.70
Gainesville, Tex.¶ (1½-in. and less)	.55
Gary and Miller, Ind.†	1.15–1.40a
Grand Rapids, Mich.¶ (1-in. and less)	.55
Hamilton, Ohio¶ (1½-in. and less)	.50–1.00
Hersey, Mich.¶ (1-in. and less)	.50
Mankato, Minn.†	.70
Pueblo, Colo.—†River run sand	.50
Seattle, Wash.—Sand, 1/10-in. down. .25*; ¼-in. and less, same; gravel in sizes ranging from 2-in. and less to ½-in. and less	.25*
Winona, Minn.†	.60
York, Penn. Sand, ¼-in. and less, 1.00; 1/10-in. down	1.10

*Cubic yard. †Fine sand, 1/-10-in. down. (a) Cu. yd., delivered Chicago. ¶Gravel.

Current Price Quotations

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Portland Cement

	Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.91¼	3.05	4.30¶
Atlanta, Ga.	.....	1.99	*3.49¶
Baltimore, Md.	.....	2.25	3.40¶
Berkeley, Calif.	.....	2.14	.....
Birmingham, Ala.	.....	1.65	*3.15¶
Boston, Mass.	.57	1.78	3.27¶
Buffalo, N. Y.	.61¼	1.95	3.35¶
Butte, Mont.	.90¼	3.61	.....
Cedar Rapids, Ia.	.....	2.13	2.99f
Centerville, Calif.	.....	2.14	.....
Charleston, S. C.	.....	2.09a	*3.26¶
Cheyenne, Wyo.	.71½	2.26	.....
Chicago, Ill.	.....	1.85	3.15¶
Cincinnati, Ohio	.....	1.92	3.22¶
Cleveland, Ohio	.....	1.94	3.24¶
Columbus, Ohio	.....	1.92	3.22¶
Dallas, Texas	.....	1.65	3.14¶
Davenport, Iowa	.....	2.04	.....
Dayton, Ohio	.....	1.84	3.24¶
Denver, Colo.	.63¾	2.55	.....
Des Moines, Iowa	.48½	1.94	2.99f
Detroit, Mich.	.....	1.95	3.25¶
Duluth, Minn.	.....	2.04	.....
Fresno, Calif.	.....	2.33	.....
Houston, Texas	.....	1.75	3.38¶
Indianapolis, Ind.	.54¾	1.69–1.89	f2.44–3.19¶
Jackson, Miss.	.....	2.09	*3.59¶
Jacksonville, Fla.	.....	2.14b	*3.26¶
Jersey City, N. J.	.....	2.13	3.28¶
Kansas City, Mo.	.45½	1.82	f2.87–2.97¶
Los Angeles, Calif.	.37½	1.50	.....
Louisville, Ky.	.55½	1.91	f2.92–3.31¶
Memphis, Tenn.	.....	2.05	f2.74–*3.55¶
Merced, Calif.	.....	2.01	.....
Milwaukee, Wis.	.....	2.00	3.30
Minneapolis, Minn.	.....	2.21	.....
Montreal, Que.	.....	1.60	.....
New Orleans, La.	.43	1.82	3.22¶
New York, N. Y.	.60¾	1.93	3.33¶
Norfolk, Va.	.....	1.87	3.27¶
Oklahoma City, Okla.	.54	2.16	3.31¶
Omaha, Neb.	.50¼	2.01	3.16¶
Peoria, Ill.	.....	2.02	3.32¶
Pittsburgh, Penn.	.....	1.85	3.01¶
Philadelphia, Penn.	.....	2.15	3.30¶
Phoenix, Ariz.	.....	3.51	.....
Portland, Ore.	.....	2.30	.....
Reno, Nev.	.....	2.66	.....
Richmond, Va.	.....	2.16	3.56¶
Sacramento, Calif.	.....	2.25	.....
Salt Lake City, Utah	.70¼	2.81	.....
San Antonio, Texas	.....	.....	3.42¶
San Francisco, Calif.	.....	2.14	.....
Santa Cruz, Calif.	.....	2.10	.....
Savannah, Ga.	.....	2.09a	*3.16¶
St. Louis, Mo.	.48¾	1.50–1.70	f2.65–3.00¶
St. Paul, Minn.	.....	2.21	.....
Seattle, Wash.	.....	2.40	f3.70
Tampa, Fla.	.....	1.80	*3.41¶
Toledo, Ohio	.....	2.03	3.33¶
Topeka, Kan.	.50¼	2.01	3.16¶
Tulsa, Okla.	.50¾	2.03	3.18¶
Wheeling, W. Va.	.....	1.92	3.07¶
Winston-Salem, N. C.	.....	2.14	3.54¶

Mill prices f.o.b. in carload lots, without bags, to contractors.

Albany, N. Y.	.....	2.15	.....
Bellingham, Wash.	.....	2.25	.....
Buffington, Ind.	.....	1.60	.....
Chattanooga, Tenn.	.....	2.05	.....
Concrete, Wash.	.....	2.35	.....
Davenport, Calif.	.....	2.05	.....
Hannibal, Mo.	.....	1.90	.....
Hudson, N. Y.	.....	1.75	.....
Leeds, Ala.	.....	1.65	.....
Lime & Oswego, Ore.	.....	2.40	.....
Mildred, Kan.	.....	2.35	.....
Nazareth, Penn.	.....	2.15	.....
Northampton, Penn.	.....	1.75	.....
Richard City, Tenn.	.....	2.05	.....
Steelton, Minn.	.....	1.85	.....
Toledo, Ohio	.....	2.20	.....
Universal, Penn.	.....	1.60	.....

NOTE: With exception of prices for "Incor" and "Velo" cement, prices quoted are net prices, without charge for bags, and all discounts deducted. Add 40c per bbl. for bags. (a) 44c refund for paid freight bill. (b) 38c bbl. refund for paid freight bill. (f) "Velo" cement, including cost of paper bag, 10c disc. 10 days. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c disc. 15 days. *Subject 25c bbl. dealer discount.

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.	.....	1.30	1.10	1.00	1.00	.....
Ft. Spring, W. Va.	.35	1.35	1.35	1.25	1.15	1.15
Munns, N. Y.	.75	1.15	1.15	1.00	1.00	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
Shaw's Junction, Penn. (e)	.85	1.35–1.60	1.35	1.35	1.35	1.35
Oriskany Falls, N. Y. (f)	.50–1.00	1.00–1.35	1.00–1.35	1.00–1.35	1.00–1.35	1.00–1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill. (b)	1.85	.....	1.85	.....	.....	.....
Davenport, Iowa	1.00	1.50	1.50	1.30	1.30	1.30
Dubuque, Iowa	1.00	1.10	1.10	1.00	1.00	.....
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05–1.70	1.05–1.70	.....
Greencastle, Ind.	1.25	1.10	1.10	1.10	1.00	1.00
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
McCook, Ill.	.90	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.75–1.00	1.65–1.85	1.45	1.15	1.05	.95
Sheboygan, Wis.	1.20	1.20	1.20	1.20	.....	.....
Stone City, Iowa	.75	.....	1.15	1.00	1.00	.....
Toronto, Canada	2.50	2.70	2.50	2.50	2.50	2.50
Waukesha, Wis.	.....	.90	.....	.90	.90	.....
Wisconsin points	.50	.....	.100	.90	.90	.....
Youngstown, Ohio	1.00	1.00	1.25	1.25	1.25	1.25
SOUTHERN:						
Cartersville, Ga.	1.00	1.65	1.65	1.35	1.15	1.15
Chico and Bridgeport, Texas	1.00–1.35	1.10–1.30	1.10–1.25	1.25	1.00–1.20	1.00
Cutler, Fla.	.50– .75r	.....	.....	1.75r	.....	1.10g
El Paso, Texas	.50	1.25	1.25	1.00	1.00	1.00
Olive Hill, Ky.	1.00	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.25	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (t)	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.10	1.25	1.25	1.25	1.00	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Rock Hill, St. Louis, Mo.	1.45	1.45	1.45	1.45	1.45	1.45
Stringtown, Okla.	1.00–1.35	1.10–1.30	1.10–1.25	1.25	1.00–1.20	1.00

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Chico, Texas	2.50	2.00	1.45	1.20	1.15	.....
Duluth, Minn.	.90–1.25	2.25–2.75	1.55	1.55	1.55	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	2.50	2.00	1.45	1.25	1.20	1.15
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.55	2.30	2.10	1.70	1.70	.....
Richmond, Calif.	.70	.....	1.00	1.00	1.00	.....
Toronto, Canada	4.70	5.80	4.05	4.05	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite	.....	.....	1.75	1.75	1.60	.....
Chicago, Ill.—Granite	2.00	1.70	.....	1.50	1.50	.....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	.....	.....	2.25–2.50s	.....	.....	.....
Lithonia, Ga.—Granite	.75	1.50	1.35	1.25	1.15	.....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.—Granite	3.00–3.50	.....	2.00–2.25	2.00–2.25	.....	1.25–3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Toccoa, Ga.—Granite	.40	.....	1.40	1.25	1.25	1.25

(a) Limestone, ¼ to ⅛ in., 1.35 per ton; Lime flour, 8.50 per ton. (b) Wagonloads. (c) 1 in., 1.40. (d) 2-in., 1.30. (e) Price net after 10c cash discount deducted. (f) Ballast, 75c per ton. (g) Per cu. yd., 3-in. and less. (n) Ballast, R.R., .90; run of crusher, 1.00. (q) Crusher run, 1.40; ¼-in. granlithic finish, 3.00. (r) Cu. yd. (s) 1-in. and less, per cu. yd. (t) Rip rap, 1.20–1.40 per ton.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Allentown, Penn.	1.00–1.50	.40– .60	.80–1.00	.50– .80	.50– .80	.60– .80	.80
Bethlehem, Penn. (a)	1.25–1.75	.50– .70	.....	.60– .80	.70– .80	.60– .90	.80
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Hokendauqua, Penn.	1.25–1.75	.60	.90	.60– .90	.60– .90	.60– .90	.....
Reading, Penn.	2.00	1.00	.....	1.00	.....	.....	.....
Swedeland, Penn.	1.50–2.50	.60–1.10	1.00–1.25	.90–1.25	.90–1.25	1.25	1.25
Western Pennsylvania	2.00	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	.....
Jackson, Ohio	2.05*	1.05*	1.80*	1.30*	1.05*	1.30*	.....
Toledo, Ohio	1.50	1.10	1.25	1.25	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	.....
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.90
Longdale, Va.	2.50	.75	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05	.55*	.....	1.15*	.90*	.90*	.....

5c per ton discount on terms. †1¼ in. to ¼ in., 1.05; ⅝ in. to 10 mesh, 1.25*; ⅝ in. to 0 in., .90*; ¼ in. to 10 mesh, .80*. (a) Unwashed, 1.00–1.25.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$; 0% $MgCO_3$; 100% thru 4 mesh 1.85

Belfast, Me.—Analysis, $CaCO_3$, 90.4%; $MgCO_3$, trace; 90% thru 100 mesh, per ton 10.00

Branchton, Penn.—50% thru 100 mesh, in sacks, $5.00; bulk 3.50

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh 1.50

Cartersville, Ga.—90% thru 100 mesh, 2.00; 50% thru 50 mesh 1.50

Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton 6.00

Joliet, Ill.—Analysis, 52% $CaCO_3$; 48% $MgCO_3$; 90% thru 100 mesh 3.50

Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, bags, 3.75; bulk 2.50

Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton 2.00

Marlbrook, Va.—(Lime marl)—Analysis, $CaCO_3$, 90%; 90% thru 100 mesh, in bags, 3.50–4.00; bulk 2.00–2.25

Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh 4.50

Sibley, Mich.—Analysis, 87.47% $CaCO_3$; 8.30% $MgCO_3$; 60% thru 100 mesh, bulk, per ton, 2.30; 100-lb. paper bags, f.o.b. Sibley, Mich., per ton 3.75

Agricultural Limestone

(Crushed)

Atlas, Ky.—Analysis, $CaCO_3$, 94-98%; $MgCO_3$, trace; 50% thru 4 mesh 1.00

Bedford, Ind.—Analysis, 98½% $CaCO_3$; ½% $MgCO_3$; 90% thru 10 mesh; 30% thru 100 mesh 1.50

Chico and Bridgeport, Texas—Analysis, 95% $CaCO_3$; 1.3% $MgCO_3$; 90% thru 4 mesh 1.00

Charles-Town, W. Va.—Lime Marl—Analysis, 95% $CaCO_3$, 50% thru 100 mesh, bulk, 3.00; including burlap bags 4.50

Colton, Calif.—100% thru 14 mesh, bulk 3.50

Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton 1.10

Dubuque, Ia.—Analysis, 34.96% $CaCO_3$; 59.62% $MgCO_3$; 90% thru 4 mesh ..... .95

Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh 1.00

Fort Spring, W. Va.—Analysis, 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 100 mesh 1.15

Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh, sacked 5.00

Jamesville, N. Y.—Analysis, 90% $CaCO_3$; 5% $MgCO_3$; 90% thru 100 mesh; in sacks, 4.60; bulk 3.35

Lannon, Wis. — Analysis, 54% $CaCO_3$ 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh 2.00

Screenings (¼ in. to dust) 1.00

Marblehead, Ohio—90% thru 100 mesh 3.00

90% thru 50 mesh 2.00

90% thru 4 mesh 1.00

McCook and Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh ..... .90

Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Kokomo, Ind. —85% thru 10 mesh, 25% thru 100 mesh 1.50

Rocky Point, Va.—50% thru 200 mesh, bulk, in carloads, 2.00; 100-lb. paper bags, 3.25; 200-lb. burlap bags 3.50

Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh 1.15–1.70

Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75

West Stockbridge, Mass.* — Analysis, 95% $CaCO_3$; 90% thru 100 mesh, bulk 100-lb. paper bags, 4.75; 100-lb., cloth ..... 3.50 / 5.25

Waukesha, Wis.—90% thru 100 mesh, 4.00; 50% thru 100 mesh 2.10

*Less 25c cash 15 days.

Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton 6.00

Hillsville, Penn., sacks, 5.10; bulk 3.50

Joliet, Ill.—Analysis, 50% $CaCO_3$; 42% $MgCO_3$; 95% thru 100 mesh (bags extra) 3.50

Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk 2.25–3.50

Waukesha, Wis. — 90% thru 100 mesh, bulk 4.00

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	12.00	.....	.....	17.50	.....	2.00
Buffalo, N. Y.	.....	.....	.....	12.00	.....	.....	.....	.....
Knickerbocker, Devault, Cedar Hollow and Rambo, Penn.*	.....	9.50	9.50	9.50	.....	9.50	8.50	.....
Lime Ridge, Penn.	9.00	9.00	9.00	.....	7.00	.....	5.00	.....
CENTRAL:								
Afton, Mich.	.....	.....	.....	.....	.....	10.75	7.50	12.11
Carey, Ohio	9.50	9.50	9.50	.....	8.00	.....	8.00	1.50
Cold Springs, Ohio	.....	7.75	7.75	.....	7.00	9.00	7.00	.....
Gibsonburg, Ohio	10.50	.....	7.75	.....	7.00	9.00	7.00	.....
Huntington, Ind.	.....	6.50	6.50	.....	.....	.....	.....	.....
Little Rock, Ark.	.....	14.40	.....	14.40	.....	.....	11.90	1.79
Marblehead, Ohio	.....	6.50	6.50	.....	.....	.....	7.00	1.50[3]
Milltown, Ind.	.....	7.50– 8.50	.....	8.25– 9.25	7.00[5]	9.25[6]	6.50[7]	1.40[8]
Scioto, Ohio	.....	7.00	7.00	8.00	.....	.62½	6.50	1.50
Sheboygan, Wis.	.....	10.50	10.50	10.50	.....	.....	9.50	2.00[4]
Tiffin, Ohio	.....	.....	.....	.....	8.00	10.00	.....	.....
Wisconsin points	.....	11.50	.....	.....	.....	.....	9.50	.....
Woodville, Ohio	10.50	7.75	7.75	11.50[21]	7.00	9.00[9]	7.00	1.50[3]
SOUTHERN:								
Keystone, Ala.	17.00	9.00	9.00	8.00–12.00	.....	.....	6.00[21]	1.35
Knoxville, Tenn.	.....	9.00	9.00	9.00	.....	.....	8.00	.....
Ocala, Fla.	12.00	10.00	10.00	12.00	.....	.....	.....	1.40
Pine Hill, Ky.	.....	9.00	9.00	9.00	.....	.....	8.00	.....
WESTERN:								
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00‡	.....
Los Angeles, Calif.	.....	.....	.....	.....	.....	.....	2.00	.....
San Francisco, Calif.	19.00	14.00–17.00	12.50	14.00–19.00	14.50[20]	.90[17]	11.00[19]	1.85[17]
San Francisco, Calif.†	20.00	16.00	12.00	20.00	16.00	.....	16.00	1.95

[1]Also 6.00. [2]To 1.35. [3]Wooden, steel, 1.60. [4]Steel. [5]To 7.50. [6]To 9.75. [7]To 7.00. [8]To 1.50 in steel drums; 1.25 and 1.35 in waterproof bags. [9]80-lb. [10]Per bbl. [17]Less credit for return of empties. [19]To 14.50. [20]Also 13.00. [21]To 8.00. [24]Superfine, 92.25% thru 200 mesh. *Price to dealers. †Wood-burnt lime. ‡Also 12.00.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Penn Argyl, Penn.—Screened, all thru 200 mesh, 7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton.
Granville, N. Y.—Red, green and black, $7.50 per ton.
Pen Argyl, Penn.—Blue-black, 6.00 per ton in bulk; 6.50 in 150-lb. burlap bags, plus 10c per bag.

Roofing Slate

Prices per square—Standard thickness.

City or shipping point:	3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Arvonia, Va.—Buckingham oxford grey	13.88	17.22	24.99	29.44	34.44	45.55
Bangor, Penn.—No. 1 clear	10.50–14.50	24.50	29.00	33.50	44.50	55.60
No. 1 ribbon	9.00–10.25	20.00	24.50	29.00	40.00	51.25
Gen. Bangor No. 2 ribbon	6.75– 7.25	.....	.....	.....	.....	.....
Gen. Bangor mediums	9.50–11.25	.....	.....	.....	.....	.....
No. 1 Albion clear	9.00–10.50	16.00	23.00	27.00	37.00	46.00
Chapman Quarries, Penn.—No. 1	8.50–11.25	(Vari-tone, 12.00–13.00)				
Medium	7.75– 9.00	.....	.....	.....	.....	.....
Hard vein	.....	16.00	23.00	26.00	32.00	40.00
Granville, N. Y.—Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green and gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple and unfading green	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Monson, Maine	19.80	24.00	.....	.....	.....	.....
Pen Argyl, Penn.*						
Graduated slate (blue)	.....	16.00	23.00	27.00	37.00	46.00
Graduated slate (grey)	.....	18.00	25.00	29.00	39.00	48.00
Color-tone	11.50–12.50; Vari-tone, 12.00–13.00; Cathedral gray, 14.00–15.00					
No. 1 clear (smooth text)	7.25–10.50; No. 1 clear (rough text), 8.25–9.50					
Albion-Bangor medium	8.00–9.00; No. 2 clear, 8.00–9.00; No. 1 ribbon, 8.00–8.50					
Slatedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1 clear	9.50	18.00	22.00	26.00	36.00	46.00
Blue Mountain No. 2 clear	8.00	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.
*Unfading grey, 14.00–15.00; 10% disc. to roofer; 10%–8⅓% to wholesaler.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc, per ton 5.00
- Ground talc (20-50 mesh), bags 6.50
- Ground talc (150-200 mesh), bags 9.00
- Pencils and steel crayons, gross 1.50– 2.00

Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¾% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh 7.50– 8.00
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of bags. Terms 1%, 10 days.

Clifton, Va.:
- Crude talc, per ton 4.00
- Ground talc (150-200 mesh), in bags 12.00

Conowingo, Md.:
- Crude talc, bulk 4.00
- Ground talc (150-200 mesh), in bags 14.00
- Cubes, blanks, per lb. ..... .10

Emeryville, N. Y.:
- Ground Talc (200 mesh), bags 13.75
- Ground talc (325 mesh), bags 14.75

Hailesboro, N. Y.:
- Ground talc (300-350 mesh) in 200-lb. bags 15.50–20.00

Henry, Va.:
- Crude (mine run) 3.50– 4.50
- Ground talc (150-200 mesh), bags 6.25–14.00

Joliet, Ill.:
Ground talc (200 mesh) in bags:
- California white 30.00
- Southern white 20.00
- Illinois talc 10.00

Los Angeles, Calif.:
- Ground talc (150-200 mesh) in bags 16.00–25.00

Natural Bridge, N. Y.:
- Ground talc (325 mesh), bags 10.00–15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

- Gordonsburg, Tenn.—B.P.L. 65-72% 3.75– 4.25
- Mt. Pleasant, Tenn.—B.P.L., 75% 6.50
- Run of plant fines, 72% B.P.L., per ton of 2000 lb. 5.00

Ground Rock
(2000 lb.)

- Gordonsburg, Tenn.—B.P.L. 65–70% 3.75– 4.25
- Mt. Pleasant, Tenn. — Lime phosphate: B.P.L. 72½% 11.20
- Mt. Pleasant, Tenn.—B.P.L., 72% 5.00– 5.50

Florida Phosphate

(Raw Land Pebble)
(Per Ton)

Florida—F.o.b. mines, gross ton, 68/66%
- B.P.L., Basis 69% 3.25
- 70% min. B.P.L., Basis 70% 3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

- Pringle, S. D.—Mine run, per ton 100.00–125.00
- Punch mica, per lb. ..... .06
- Scrap, per ton, carloads 20.00

Rumney Depot, Bristol and Cardigan, N. H.—Per ton:
- Mine scrap 22.50
- Mine run (plate) 280.00
- Clean shop scrap 27.50
- Roofing mica 42.00
- Punch mica 160.00
- Trimmed mica, per ton, 20 mesh, 42.00; 40 mesh, 45.00; 100 mesh, 60.00; 200 mesh 75.00

Trenton, N. J.—Mine scrap, per ton 20.00

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	—Plaster Board— ⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Blue Rapids, Kan.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Centerville, Iowa	.....	.....	6.00	7.00	.....	7.50	8.50	10.50a	.....	.....	.....	.....	.....
East St. Louis, Ill.—Special Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton, floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 3 in. long, 17c per ft., 23.00 per ton.													
Ft. Dodge, Iowa; N. Holston, Va.; Akron, N. Y.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Grand Rapids, Mich.	.....	.....	7.00d	.....	8.00d	8.00d	19.85c	8.00d	29.25e	21.00d	.....	15.00	22.50
Los Angeles, Calif. (b)	.....	.....	7.00–9.50	7.00–9.50	10.00–12.00	.....	10.00–12.00	.....	.....	.....	.....	.....	.....
Medicine Lodge, Kan.	1.40	.....	.....	.....	.....	.....	11.50d	.....	16.00d	11.50d	.....	.....	.....
Portland, Colo.	.....	7.00	7.00	9.00	9.00	9.50	9.00	.....	27.50	.....	22.50	27.50	.....
Providence, R. I. (x)	.....	.....	.....	12.00–13.00e	.....	.....	.....	.....	.....	.....	.....	.....	.....
Seattle, Wash. (z)	6.00	9.00	9.00	13.00	.....	.....	14.00	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	.....	25.00g	33.00f

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) White molding. (b) Plasterboard, ⅜-in., 16c-17c sq. yd. (c) Satin Spar, in paper bags. (d) Includes paper bags. (e) Includes jute sacks. (f) "Gyproc," ⅜ in. by 48 in. by 5 and 10 ft. long. (g) ⅜ in. by 48 in. by 3 to 4 ft. (x) "Fabricaste" gypsum blocks, 2- and 3-in., f.o.b. motor trucks at plants, 7¼c-8¼c. Block setting plaster, per ton, in jute sacks, 12.00. (y) Jute sacks, 18.00; paper sacks, 16.00. (z) Gypsum partition tile, 3-in., 9c per sq. ft., 4-in., 11c per sq. ft.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Cranberry Creek, N. Y.—Bio-Spar, per ton in bags in carload lots, 9.00; less than carload lots, 12.00 per ton in bags, bulk, per ton		7.50
Crown Point, N. Y.—Mica Spar	¶9.00–‖12.00	
Davenport, Iowa — White limestone, in bags, per ton	‖6.00	‖6.00
Easton, Penn.—Royal Green	16.00–20.00a	
Harrisonburg, Va.	11.00–14.50	
Middlebrook, Mo.—Red		20.00–25.00
Middlebury, Vt.—Middlebury white	¶9.00–‖10.00	
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		c5.50
Phillipsburg, N. J.—Royal green granite		15.00–18.00
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Stockton, Calif.—"Nat-rock" roofing grits		12.00–40.00
Tuckahoe, N. Y.—Tuckahoe white	8.00	
Warren, N. H.		8.00–15.00

¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L.

Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh, per ton	18.00

Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140 mesh (bulk)	19.00
Keystone, S. D.—Color, white; analysis, K_2O, 13.50%; Na_2O, 2.25%; SiO_2, 64.10%; Fe_2O_3, .03%; Al_2O_3, 20.10%, pulverized 99% thru 200 mesh, in bags, 17.00; bulk	16.00
Crude, in bags, 9.50; bulk	8.50
Coatesville, Penn.—Color, white; analysis, K_2O, 12.30%; Na_2O, 2.86%; SiO_2, 66.05%; Fe_2O_3, .08%; Al_2O_3, 18.89%; crude, per ton	8.00
Erwin, Tenn.—White; analysis, K_2O, 12%; Na_2O, 3.5%; SiO_2, 68%; Fe_2O_3, .07%; Al_2O_3, 18.5% pulverized, 95% thru 325 mesh, in bags, 15.00–17.50; bulk, 15.00–17.00; crude feldspar, bulk	9.00
Trenton, N. J.—White; analysis, K_2O, 13-14%; Na_2O, 2-2½%; SiO_2, 64-65%; Fe_2O_3, 0.07; Al_2O_3, 18.50-19.25%; pulverized, 97% thru 325 mesh, crude, 8.50 per ton, ground	21.00
Rumney and Cardigan, N. H. — Color, white; analysis, K_2O, 9-12%! Na_2O, trace; SiO_2, 64-67%; Al_2O_3, 17-18%, crude, bulk	7.00– 7.50
Rumney Depot, N. H.—Color, white; analysis, K_2O, 8-13%; Na_2O, 1-1½%; SiO_2, 62-68%; Al_2O_3, 17-18%, crude, bulk	7.00– 7.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; pulverized, bulk	18.00

(Bags, 15c extra.)

Cement Drain Tile

Graettinger, Iowa. — Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in. 1.35; 36-in.	2.00
Longview, Wash.—Drain tile, per 100 ft.	
3-in.	5.00
4-in.	6.00
6-in.	10.00
Tacoma, Wash.—Drain tile, per 100 ft.	
3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	10.00

Chicken Grits

Centerville, Iowa	9.25
Belfast, Me.—(Agstone), per ton, in carloads	10.00
Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per ton	8.50–10.00
Coatesville, Penn.—(Feldspar), per ton, in bags of 100 lb. each	8.00
Cranberry Creek, N. Y.—Per ton, in carload lots; in bags, 9.00; bulk, 7.50. Less than carload lots, in bags	12.00
Davenport, Iowa — High calcium carbonate limestone, in bags L.C.L., per ton	6.00
El Paso, Texas—(Limestone) per 100-lb. sack	.75
Los Angeles, Calif.—Per ton, including sacks:	
Gypsum	7.50 –9.50
Middlebury, Vt.—Per ton (a)	10.00
Randville, Mich.—(Marble), bulk	6.00
Seattle, Wash.—(Gypsum), bulk, ton	10.00
Warren, N. H.	8.50– 9.50
Waukesha, Wis.—(Limestone), per ton	7.00
West Stockbridge, Mass.	¶7.50–‖9.00
Wisconsin Points—(Limestone), per ton	15.00

(a) F.o.b. Middlebury, Vt. ¶C.L. ‖L.C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton Wis.	10.50
Dayton, Ohio	12.50–13.50
Detroit, Mich. (d)	e13.00–16.00*b
Farmington, Conn.	16.00
Grand Rapids, Mich.*	14.00–15.00
Jackson, Mich.	13.00
Madison, Wis.	12.50a
Mishawaka, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00*
New Brighton, Minn.	8.00
Pontiac, Mich.	13.50
Portage, Wis.	15.00
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.50
Sebewaing, Mich.	12.50
South St. Paul, Minn.	9.00
Syracuse, N. Y.	13.00–15.00
Toronto, Canada (f)	13.00–15.00b
Winnipeg, Canada	15.00

Delivered on job. (a) Less 50c disc. per M 10th of month. (b) 5% disc., 10th of month. (c) Delivered in city. (d) Also 15.50. (e) Also 14.00. (f) Also 10.75; 13.00 f.o.b. jobs, less 2.25 average cartage. (g) F.o.b. yard.

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	Size 8x8x16
Camden, N. J.	16.50
Chicago District	180.00–210.00a
8x10x16	230.00–260.00a
8x12x16	280.00–330.00a
Columbus, Ohio	13.00b– 15.00†
Forest Park, Ill.	21.00*
Grand Rapids, Mich.	11.00*
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12a
Los Angeles, Calif.:	
4x8x12	4.50*
4x6x12	3.90*
4x4x12	2.90*

*Price per 100 at plant.
†Rock or panel face.
(a) Face. (b) Plain.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.:	
Red	15.00
Green	18.00
Cicero, Ill.—French and Spanish tile (red, orange, choc., yellow, tan, slate, gray) per sq., 9.50–10.00; green or blue, per sq.	11.50–12.00
Detroit, Mich.—5x8x12, per M	67.50
Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00

Cement Building Tile

Camden and Trenton, N. J.:	
3x8x16, per 100, 9.00; 3x9x16, per 100	9.00
4x8x16, per 100, 12.00; 4x9x16, per 100	13.00
6x8x16, per 100, 16.50; 6x9x16, per 100	15.50
Chicago District (Haydite):	
4x 8x16, per 100	13.00
8x 8x16, per 100	20.00
8x12x16, per 100	28.00
Columbus, Ohio:	
5x8x12, per 100	6.00
Grand Rapids, Mich.:	
5x8x12, per 100	6.00
Houston, Texas:	
5x8x12 (Lightweight), per M	80.00
Longview, Wash.:	
4x6x12, per 1000	55.00
4x8x12, per 1000	64.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Camden & Trenton, N. J.	17.00	
Chicago District "Haydite"	14.00	
Columbus, Ohio	16.00	17.00
Ensley, Ala. ("Slagtex")	13.00a	
Forest Park, Ill.		37.00
Longview, Wash.	16.50	20.00– 40.00
Milwaukee, Wis.	14.00	18.00–20.00
Omaha, Neb.	17.00	30.00– 40.00
Philadelphia, Penn.	15.50	
Portland, Ore.	12.00	22.50– 55.00
Prairie du Chien, Wis.	14.00	22.00– 25.00
Rapid City, S. D.	18.00	30.00– 40.00

(a) Delivered on job; 10.00 f.o.b. plant.

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00

Note—Bags extra and returnable for full credit.

Stone-Tile Hollow Brick

Prices are net per thousand f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.	.....	53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.	.....	55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans, La.	35.00	45.00	60.00
Norfolk, Va.	35.00	50.00	65.00
Passaic, N. J.	35.00	50.00	65.00
Patchogue, N. Y.	.....	60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% disc.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8-in.	10 in.	12 in.	15-in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Grand Rapids, Mich.(b)	.....	.....	.....	.60	.70	.90	1.20	.....	.....	1.80	2.10	2.35	3.50	4.00	5.60	6.90	7.85
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	1.20	1.60	.....	2.00	.....	2.75	3.40	.....	6.50	.....	10.00
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	.85½	.....	1.14	.....	.....	1.81	.....	2.47	3.42	4.13	5.63	6.49	7.31

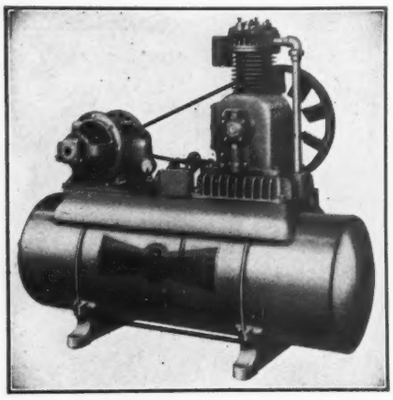
(a) 24-in. lengths. (b) Reinforced. †21-in. diameter.

New Machinery and Equipment

New Single-Stage Compressor

A NEW air-cooled single-stage compressor has just been brought out by the Gardner-Denver Co., Quincy, Ill. This is to be known as the A-C-E Model and consists of a 3½x4 duplex compressor and a 5 hp. motor mounted on a cast iron base on top of the air receivers. The unit has a rated displacement of 26 cu. ft. per min., operating at 600 r.p.m. This rate can be reduced and altered to fit the particular circumstances.

The suction and discharge valves are enclosed in separate compartments, a feature which is said to prevent the air from being heated when passing through the intake valves.



New single-stage air compressor

An automatic or hand operated start and stop control is furnished as standard equipment and operated in conjunction with the Penn type pressure and moisture unloader. The unloader is set to cut in at 130 lb. and out at 165 lb. Continuous operation is claimed to be assured by this control. Lubrication for the compressor is by the controlled splash type.

Other features of this compressor are: The use of the V-type belt drive, a fan type of flywheel, use of Hyatt type of roller bearings, after cooler in the base and a muffler for the suction opening.

New Contact Cable

CONTROL of machines and signaling devices without the use of the usual switch devices are some of the features claimed for a new contact cable recently brought out by the Bishop Wire and Cable Co., New York. All that is necessary, the makers say, is to press or punch this contact cable at any point and the circuit is closed.

The invention consists of a water proof, dust proof and acid proof cable about the size of an ordinary lead pencil, which, when compressed at any point in its entire length, throws a switch, turns on a light, sounds a signal or does other things which usually require direct contact with a button or switch at a given stationary point. In other words, the cable is one continuous switch along its entire length, whether it be 15 or 1500 ft.

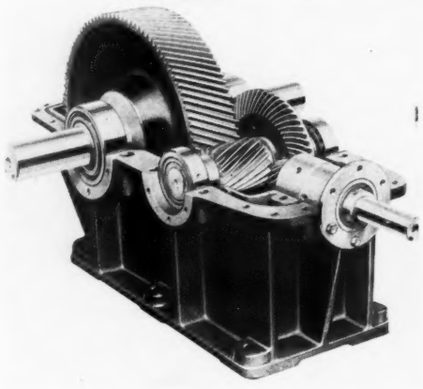
The cable has a novel type of construction. Two conductors, enclosed by the outside insulation, are left bare but separated from each other by an "isolating cushion" of rubber. When pressure is applied this "isolating cushion" yields and permits the outer conductor to contact with a wire which, in turn, is always in contact with the inner conductor, thus closing the circuit. When pressure is relieved the "isolating cushion" returns the outer conductor to its normal position.

Used with a relay switch, the Bishop contact cable becomes operative at the point of pressure—wherever the operator happens to be standing.

New Right Angle Drive Speed Reducer

THE Falk Corp., Milwaukee, Wis., has brought out a line of right angle drive speed reducers to supplement its line of parallel shaft drives. The new line includes both horizontal and vertical shafts.

One feature of the Falk right angle drive is a combination of single helical and spiral bevel gears, a combination claimed to make a quiet, cool running reducer with an initial efficiency of over 95% which can be maintained throughout the life of the unit, the manufacturers say. Another significant feature is the reversible construction of gears and shafts. If the gears become worn in service, shafts can be turned end for end to permit using the opposite and unworn sides of the teeth. This type of construction is said to have proven successful in the past in Falk parallel shaft drives.



Combination of single helical and spiral bevel gears is a feature of this new speed reducer

Ratings on the new line range from 1/16 hp. per 100 r.p.m. on the smallest unit of 565 hp. at 100 r.p.m. on the largest. Ratios are from 1.5:1 to 5.18:1.

The lubricating system of new units is similar to that used in the company's parallel shaft reducers. A complete line of welded steel motor beds has been developed to accommodate all motors coming within the capacities of the reducers.

New Truck Body for Concrete and Aggregates

A NEW truck body which can be used to carry ready-mixed concrete and bulk materials, as crushed stone, sand and gravel, etc., is announced by the C. O. Bartlett and Snow Co., Cleveland, Ohio. The body, known as the "Movable V Concrete Body," can be mounted on any chassis, the manufacturers say, and is claimed to have low initial, operating and maintenance costs.

The design is simple, featuring among other things fast loading and fast discharge facilities, discharge control and complete unobstructed interior, thus permitting the haulage of the bulk materials mentioned above.

Truck body designed for ready-mixed concrete or aggregates

There is no power take-off for agitation, yet segregation before pouring is overcome, the manufacturers state, by churning the concrete before it is poured. Concrete is carried in the body with the movable side plates together at the bottom in the form of the letter "V." Arriving at the job, the plates are wound back to a vertical position, caus-

ing the load to drop and spread over the entire wide horizontal bottom of the body. This is said to mix the mass and fluid. Then the body is tilted and the concrete flows toward the end gate and is churned as it passes through and out.

To carry stone, sand and gravel, etc., the movable plates are cranked to their vertical position and the interior becomes a clear rectangular body suitable for transportation of such materials.

New Twin Screw Gravel and Sand Washer

SUPPLEMENTING its line of single-screw sand and gravel washers, the Eagle Iron Works, Des Moines, Iowa, has recently introduced a twin-screw washer double the capacity of the single machines. The tubs are 57 in. wide and 12 ft. and

Twin screw gravel and sand washer

15 ft. long for gravel and sand washing or dewatering, respectively.

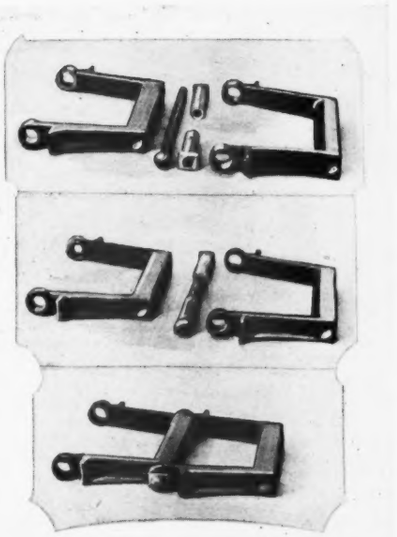
The operation principle is similar to that used in the single-screw machines. There is said to be a little more active scrubbing action in the twin screw machines because of the extra agitation of the two screws throwing material to the center in opposition to each other. Wash water is introduced through bottom inlets.

The spiral screws for gravel washing can be furnished 18 or 20 in. in dia., depending on the size of gravel and capacity desired. The sand washer is furnished with 20-in. screws.

Complete dewatering is claimed to be obtained in the sand washers by its extra length and in both machines by a curb around the material discharge opening.

New Manganese Steel Drag Chain

A NEW type of conveyor or drag chain (Brayton patent) has recently been designed and developed by the American Manganese Steel Co., Chicago Heights, Ill., for



Assembly details of the links in a new manganese steel drag chain

the use in handling cement clinker and other material handled by drag chains.

The links are made from manganese steel. The design of the pin has been materially changed so that in place of the usual steel pin or rivet running clear through the body of the link, each link of the new chain is supplied with two hollow manganese steel bushing pins, one for each eye of the link. These are held in place by the usual steel pin passing through them in the link barrel. This bushing arrangement enlarges the bearing surface.

In this new design there is claimed to be no bending of the pin or bushings. Chain repair is facilitated also, the manufacturers state. The advantages claimed for the new design are: Pintles do not bend or cut, and can be reversed to restore pitch; manganese steel gives longer life; easy replacement of rivets and pintles.

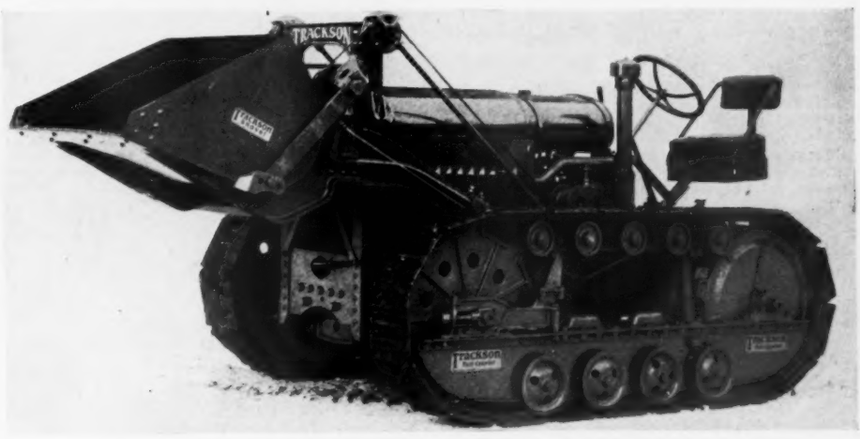
New Tractor-Shovel Finds Many Rock Products Uses

THE new Trackson shovel, developed by the Trackson Co., Milwaukee, Wis., expressly for rock products operators and others who handle crushed rock, shale, sand, coal, etc., in and around their plants, is a combination tractor and power shovel which should prove an efficient and economical piece of equipment. It can be used for stripping overburden, leveling quarry and pit floors, truck loading, shifting and spreading stockpiles and many other operations. When desired, the shovel may be removed and the tractor used as the usual piece of hauling equipment. The new shovel is built of special steel castings and heavy, reinforced structural steel. The bucket proper is made of ¼-in. steel plate with a cutting edge of special plow steel ½x6 in., and is said to be able to stand up under hard usage, such as digging into hardpan, rocky soil and abrasive materials. The bucket is controlled by a mechanical clutch-operated hoist.

The main side frames, made of heavy structural steel, are given additional strength by a special saddle casting which connects the two members and assures positive rigidity. The main frame is supported only at the front and the rear of the tractor and absorbs all thrusts and strains, so that the tractor merely serves as the power plant.

A single lever controls the bucket and an automatic clutch release eliminates any possibility of raising the shovel too high. The bucket return is either power-operated or automatic, resulting in a considerable saving of time and ability to handle more material with less effort, it is claimed by the manufacturers.

The digging range is from 8 in. below ground level to 40 in. above. Lifting capacity is given at 3000 lb. The sharp cutting edge of the bucket enables it to dig into hard surfaces, and as it is raised the bucket tilts back, preventing spillage of the material which is being carried. Shovel mountings are either wheel tractors or crawler units like the Trackson McCormick-Deering shown in the illustration. The crawlers are recommended for operation in difficult ground conditions because of their ability to gain a sure foothold and provide positive traction in soft, loose, slippery or rough surfaces met with in quarry or pit operations.



New tractor-shovel for stripping, truck loading and other uses

News of All the Industry

Incorporations

Carey Concrete Co., Monterey Ave. and C. G. W. R. R., $15,000. Bert Carey, Irene Carey and C. H. Carey.

Erie Stone Co., Toledo, Ohio, filed affidavit designating Jacob S. White, Merchants Bank Bldg., Indianapolis, Ind., as Indiana agent.

Keen Lime Manufacturing Co., Dallas, Tex., $20,000. R. C. Labenski, S. V. Labenski and Thomas B. Reagan.

Wilburg Sand Co., Inc., Crisman, Ind., 60 shares, $100 each. Lawrence N. Wilburg, James H. Blair and William Sigler.

The Silver Lane Sand Co., East Hartford, Conn., $50,000. H. L. Keeney, 26 Pitkin St., East Hartford, and others.

Saugus Sand and Stone Corp., Boston, Mass., 1000 shares no par value. Benjamin Simeone, Medford, Mass.; Paul Caputo, Boston, and Louis E. Pastorini of Waltham, Mass.

Atlas Cinder Co. (Illinois corporation) incorporated in Indiana. To produce and deal in cinders, slag, clinker, sand, gravel, etc. Indiana agent and office, Charles J. Sinclair, Gary, Ind.

Quarries

France Stone Co., Toledo, Ohio, announces the appointment of Jacob S. White, Merchants Bank Bldg., Indianapolis, Ind., as the company's agent in Indiana.

Dawson Granite Works, Winfield, Kan., has established a branch at Wichita, Kan., at 1308 East Douglas. The company was first established in Winfield about 50 years ago, and V. G. Kropp is the president.

Sand and Gravel

Atlanta Sand and Supply Co., Atlanta, Ga., announces that its offices are now located at 607-8 Forsyth Bldg., Atlanta, Ga.

Ray Hooten is making considerable improvements at his plant at Greenfield, Ind. Dredging and other equipment is being installed by Hetherington and Berner Iron Works. All the equipment will be electrically operated.

J. E. Drury, head of the gravel and construction material company which bears his name, is completing arrangements for the removal of his plant from Mather, Penn., to Waynesburg, Penn., as a result of the extension of the Chartiers Southern railroad from the coal town to the county seat.

Iron City Sand and Gravel Co., Pittsburgh, Penn., has let contract to the McClintic-Marshall Co. for the construction of five all-steel deck type barges to be used on the Pittsburgh rivers. The barges will be 135 ft. long, 27 ft. wide and 7.6 ft. deep.

Troy, Ohio. John Moyer, David Moyer and Perry Stoner of this city have purchased the gravel pit equipment of John H. Racer from the assignee, C. F. Faust, for $2,181, and have taken over the lease on the ground where the pit is located. Operations will begin at once.

Cement

Alpha Portland Cement Co. has installed complete Norblo dust collecting equipment in its raw grinding department at Ironton, Ohio.

Marquette Cement Manufacturing Co. has installed a Norblo dust collecting system in its raw grinding mill at La Salle, Ill.

Wabash Portland Cement Co., Osborn, Ohio, in pursuance of an expansion program, is adding more machinery and will increase output to 5000 bbl. of cement per day.

Huron Portland Cement Co., Detroit, Mich., is erecting a large warehouse at 840 Water St., Toledo, Ohio. Contract for construction work has been awarded to the Burrell Engineering and Construction Co., Chicago.

Pacific Coast Cement Co., Seattle, Wash., has been awarded contract on 300,000 bbl. of cement by the Phoenix Utility Co. The cement is to be used on the tunnel, dam, power house and accessory works involved in the Ariel hydro-electric development located on the Lewis river in Washington.

Ideal Cement Co.'s plant north of Fort Collins, Colo., will resume operations after a temporary shutdown, and as considerable cement is still on hand the plant will be run on half capacity for a time and will then increase to full capacity. Coal will be used at the plant hereafter rather than the natural gas which was taken from the fields north of the city in the past.

Wolverine Portland Cement Co., Coldwater, Mich., has purchased from the Coldwater National Bank its former home at the northwest corner of Chicago and Monroe Sts., Coldwater. The cement company, which for the last 10 years has been maintaining its offices in the White Block on South Monroe St., Coldwater, will remodel the building into suitable office quarters.

Idaho Portland Cement Co., Inkom, Idaho, is building a conveyor system to carry the finished cement from its new battery of concrete silos to the packing plant, according to J. B. Maxfield, first vice-president and manager of the plant. An electric traveling crane is also being installed in the clinker department. The new installations will mean a saving in labor of 12 men. Mr. Maxfield recently visited Spokane, Wash., on a 10-day business trip, and E. J. Simons, president of the company, attended a convention of machinery manufacturers in Los Angeles, stopping off at Spokane, Wash., before returning to Inkom, Idaho.

Lime

Pueblo Lime Co., 325 East Eighth St., Pueblo, Colo., is considering expansion to double present capacity, addition to cost over $50,000 with equipment. W. N. Thomas is head.

R. N. Horton Lime Co. recently completed a lime kiln a mile east of Richlands, Va. The company built a small kiln last fall and a larger one a year ago, but demand for the product has increased so rapidly it was necessary to build the new kiln. R. N. Horton is manager of the plant.

Cement Products

Toledo, Ohio. It is reported that a syndicate of Ohio, Michigan and Wisconsin interests is planning a $50,000 ready-mixed concrete plant in Toledo.

The Cinder and Cement Products Co., Pueblo, Colo., has increased the capacity of its plant to a total of 3000 blocks per day. The company is shipping blocks into Kansas and throughout southern Colorado for building construction.

Shope Brick Co., Puyallup, Wash., has added new equipment, valued at $3,000, to its plant. The company reports a gross business of $16,000 for 1929. Officers elected at the recent annual stockholders' meeting were H. H. Elerding, president; Henry Scheyer, vice-president, and Charles Delling, secretary-manager.

Miscellaneous Rock Products

Armour Fertilizer Works, 111 West Jackson Blvd., Chicago, Ill., with plant near Centerville, Tenn., will start operations in the near future at phosphate rock deposit between Centerville and Columbia, Tenn.

Asbestos-Talc Products of Washington, Inc., a newly formed company holding a lease option on the Burlington Hill, Burlington, Wash., is planning to develop asbestos and talc deposits here. According to C. R. Buck of Mt. Vernon, secretary and treasurer of the organization, the company has already developed the east side of the hill sufficiently to disclose a vein of high-grade asbestos and deposits of float talc. Associated with Mr. Buck in the enterprise are Emanuel Alm of Mt. Vernon, president; Harvey D. Williams of Seattle, Vern Branigan of Mt. Vernon, and W. A. George of Bellingham.

Obituaries

Francis Cole Pratt, 63, a vice-president of the General Electric Co., died January 26.

George T. Honstain, chairman of the board of the Western Crucible Steel Casting Co., Minneapolis, Minn., passed away on January 16.

Charles F. Aldrich, 56, president of the C. F. Aldrich Marble and Granite Co., Colorado Springs, Colo., passed away on January 24.

Cornelius J. Shea, limestone dealer and contractor, and a member of the firm of Shea and Donnelley of Boston, Mass., died January 19 at his home in Lynn, Mass.

Clarence W. Hodges, general purchasing agent of the Worthington Pump and Machinery Corp., New York City, died January 17 at Paterson, N. J., after a sudden illness. He was 53 years old.

Clarence A. Guilford, a director of the Michigan Silica Co., Rockwood, Mich., and very active in a number of Detroit enterprises, passed away at his home in Detroit, January 23, at the age of 42.

Personals

L. J. Folse has been elected secretary and treasurer of the National Portland Cement Co. of Mississippi.

Harry B. Fryer, formerly of Bluffton, Ind., is now superintendent of the Atlas Rock Co. of Miami, Fla.

George S. Whyte, president of the Macwhyte Co., Kenosha, Wis., has accepted the position of councilman in the Kenosha city government.

Frank Smetana, director of the Broadway Sand and Gravel Co., Bedford, Ohio, has been elected president of the Atlas Savings and Loan Co., Cleveland, Ohio.

Stuart M. Crocker, who recently became assistant to the president of the International General Electric Co., has been elected a vice-president of the company.

James H. Adams of the Sturm and Dillard Gravel Co., Circleville, Ohio, addressed the local chamber of commerce recently. Mr. Adams delivered a very constructive talk on gravel washing operations.

H. K. Porter has been appointed general sales manager of Hyatt Roller Bearing Co., Newark, N. J. Mr. Porter succeeds H. O. K. Meister, who was recently promoted to assistant general manager of the company.

Frank E. Guy has been appointed traffic manager of the recently formed Universal-Atlas Cement Co., with headquarters in Chicago. He held the same post in the Universal Portland Cement Co. before the recent merger with Atlas.

Russell K. Sadler, formerly head of the Aetna Sand and Gravel Co., and since June, 1928, manager of the Cleveland office of Chase Securities Co., New York City, has been promoted to assistant vice-president of the investment concern.

James Cleary has been appointed general sales manager of Combustion Engineering Corp., New York City. Mr. Cleary joined the organization in 1921 and has served successively as district manager at Philadelphia and Detroit, assistant general sales manager, and western manager at Chicago.

A. H. Gallagher, former president of the National Retarder Co., has opened temporary office in the same building he formerly occupied, 130 N. Wells St., Room 605, as a development engineer. Mr. Gallagher will work in co-operation with his son, A. H. Gallagher, Jr., in developing several projects in the rock products and other fields.

Benjamin O'Shea, formerly president of the Union Carbide Co. and the Electro Metallurgical Co., both units of Union Carbide and Carbon Corp., New York City, was elected chairman of the board of each company. **Fred H. Haggerson**, former vice-president of the two companies, was elected to succeed Mr. O'Shea as president, and **F. P. Gormely** was elected vice-president and general manager of both companies.

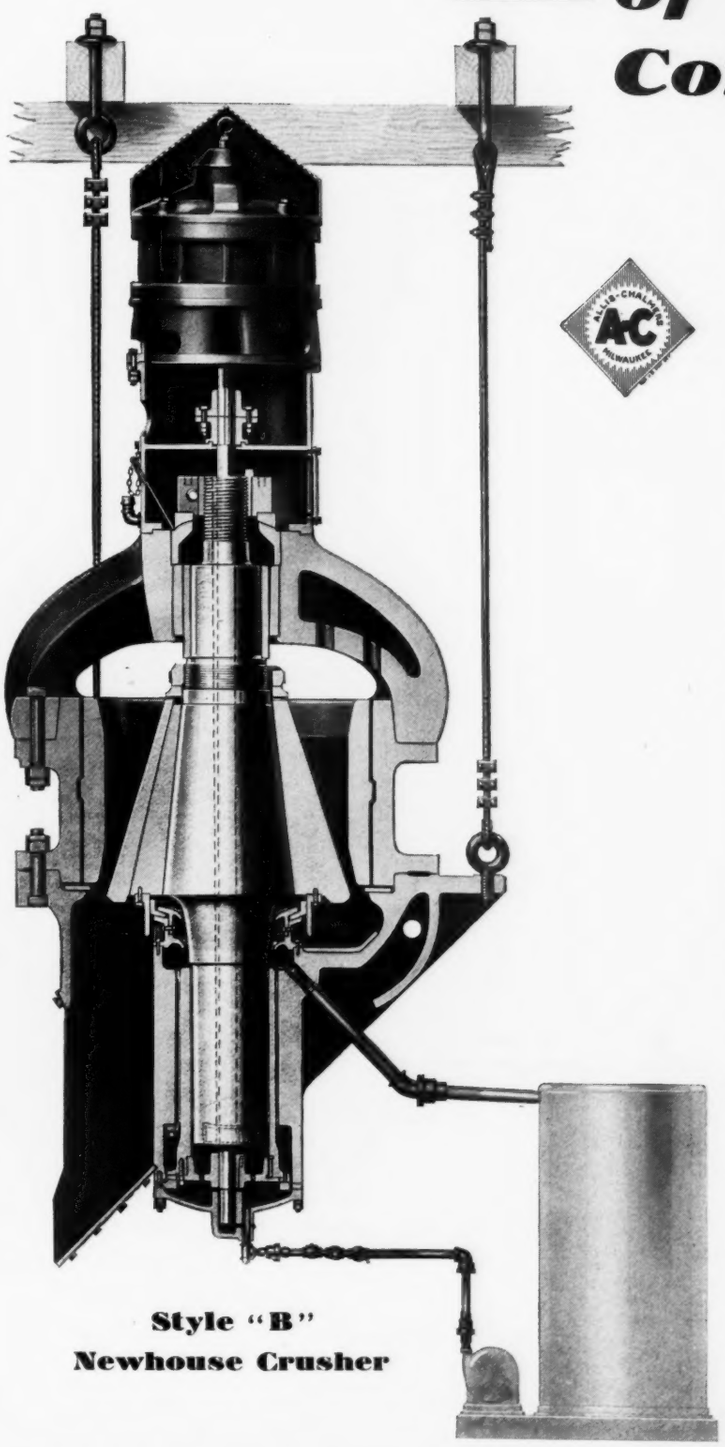
Joseph V. Santry has been appointed head of Combustion Engineering Corp., New York City, to succeed Col. H. D. Savage. Mr. Santry, who became identified with the company shortly after its organization in 1914, served successively as director and vice-president in charge of sales for five years, and as president for four years, resigning about two years ago.

George M. Verity has resigned as president of the American Rolling Mill Co., Middletown, Ohio, and was immediately elected chairman of the board at a meeting of directors. Charles R. Hook, for seven years vice-president and general manager, has been elected president and general manager, and Calvin W. Verity, who has been treasurer and assistant general manager, has been chosen vice-president and assistant general manager.

Scott Thompson, vice-president and general manager of the Lone Star Cement Co., Louisiana, New Orleans, La., is chairman of the industrial division of the New Orleans safety council. Under his direction representatives, executives, superintendents and foremen numbering more than 300 have been organized into the Foremen's Club of New Orleans.

A Better Crusher

— of Simplified Construction



Style "B"
Newhouse Crusher

THE thought uppermost in the minds of crushing plant operators is in producing the maximum amount of finished product at the lowest cost.

The Style "B" Newhouse Crusher will do this. It is a high production machine. Due to its large unobstructed feed opening and its peculiar crushing action, it is easy to feed and will take large size material without bridging. Its short, rapid, crushing stroke gives it large unit capacity with a high percentage of the finished product of cubical shape and of uniform size.

The simplicity of the Newhouse Crusher makes it an economical machine to operate and to maintain. The absence of gears will be noted from the sectional view. There are few working parts and these are readily accessible.

The Newhouse Crusher is well suited to fit into present installations. It requires little head room. It may be suspended from the framework of a building by means of cables. The use of this crusher in new plants will simplify plant layout and reduce building costs.

The details of this *crusher that requires no foundations* are described in Bulletin 1469-A. Write for a copy. Or better still, let an Allis-Chalmers Engineer show you what this crusher can do.

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS.

ALLIS-CHALMERS

Wm. R. Beck has become associated as sales engineer with the Fort Pitt Steel Casting Co., McKeesport, Penn., and **J. Trantin, Jr.**, as metallurgical engineer with the same company.

H. A. Stevenson, 7310 Woodward Ave., Detroit, Mich., has been appointed to represent the Lewis-Shepard Co.'s line of lift trucks, stackers and skid platforms in eastern Michigan.

J. H. Belknap was recently made manager of the control engineering department of the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., to succeed E. B. Newill, who resigned to become assistant to the president of the Delco Products Co.

H. W. Munday, 228 North La Salle St., Chicago, Ill., has been appointed exclusive sales representative by the Schaffer Poidometer Co., Pittsburgh, Penn., for the states of Minnesota, Iowa, Wisconsin, Michigan and the northern parts of the states of Illinois and Indiana for the sale of the Schaffer poidometer and Schaffer hydrator.

Manufacturers

Atlas Car and Manufacturing Co., Cleveland, Ohio, announces the appointment of Goggin and Mills, 5 S. Wabash Ave., Chicago, as representatives for the sale of its products in Chicago.

Chain Belt Co., Milwaukee, Wis., reports that its sales for 1929 are just over $8,000,000. This is $900,000 more than in 1928, according to C. F. Messinger, general sales manager.

Trackson Co., Milwaukee, Wis., has appointed the Valley Equipment Co., 2508-14 N. Broadway, St. Louis, Mo., as distributors for the Trackson line in the St. Louis territory. Herman Ehlig is manager of the Valley Equipment Co.

Bucyrus-Erie Co., South Milwaukee, Wis., is erecting a new plant on the Decker Road below Evansville, Ind. The company is already operating a plant here, and the new building will be 120 ft. wide and 140 ft. long.

The Buda Co., Harvey, Ill., has shipped to the New Mexico Construction Co., Albuquerque, New Mexico, four Model D4-30 Buda-M.A.N. Diesel engines. These units develop a maximum of 120 hp. and operate at a speed of 800 to 1000 r.p.m.

Wagner Electric Corp., St. Louis, Mo., announces the appointment of Major Elam as branch manager of the Minneapolis territory and the transfer of L. J. Dicianne from the position of manager of the Minneapolis office to the branch managership of the Kansas City office.

General Electric Co. is manufacturing at its Schenectady works four hydro-electric generators, each of which is rated at more than 100,000 hp. The generators, said to be the largest in the world, will be installed in the Dnieper river development at Kichkas, in the Ukraine, Russia.

The American Locomotive Co., New York City, announces the appointment of Norman C. Naylor as vice-president with headquarters in Chicago. W. Spencer Robertson, who resigned as secretary to become president of the Permutit Co., will be succeeded by J. D. Finn. Harry S. Benghart was appointed assistant secretary.

General Refractories Co., Philadelphia, Penn., has acquired the plants and business of the Evens and Howard Fire Brick Co., St. Louis, Mo. The purchase also includes the company's clay lands in Missouri and Georgia. This gives the General Refractories Co. a total of 18 plants with a capacity of almost 1,200,000 bricks a day.

Joseph T. Ryerson and Son, Inc., Chicago, has recently completed a new unit at Detroit, Mich. The new building is 120x300 ft. and will be used for storage and dispatching. In addition to the Detroit unit, the company has plants at Chicago, St. Louis, Cincinnati, Cleveland, Buffalo, Philadelphia, New York and Boston.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has established a Chattanooga sales office at 633-634 Tennessee Electric Power Bldg., Chattanooga, Tenn. A. I. Richardson is sales engineer and D. S. Kerr is in charge of the new office, which will operate as a branch of the Atlanta district office under the direction of Berrien Moore, district manager.

De Laval Steam Turbine Co., Trenton, N. J., reports that four new oil tankers for which contracts have recently been placed are to be propelled by De Laval geared steam turbines. Two are to be built by the Federal Shipbuilding and Dry Dock Co. for the Standard Shipping Co. of New York, and two by the Bethlehem Shipbuilding Corp. for the Sinclair Navigation Co.

Bissell and Land, Inc., of Pittsburgh, Penn., has been consolidated with Batten, Barton, Durstine and Osborn, Inc., of New York, Boston, Buffalo and Chicago. Batten, Barton, Durstine and Osborn maintains advertising agency offices in the above mentioned cities. The officers and staff of Bissell and Land will continue to operate as the Pittsburgh office, with J. B. Bissell as vice-president and Leon D. Hansen, manager.

Pacific Coast Steel Corp., Bethlehem Steel Co. subsidiary, has taken over the selling organization of Bethlehem Steel Co. on the Pacific Coast and will operate the properties and business of the Southern California Iron and Steel Co. and Pacific Coast Steel Co., recently acquired by Bethlehem. In addition to selling the products of the newly acquired plants, it will sell the full line of iron and steel products manufactured at the eastern plants of Bethlehem.

General Electric Co., Schenectady, N. Y., announces that T. W. Frech of Cleveland, vice-president of the company, has been granted a year's leave of absence and will become president of the new RCA Radiotron Co., and J. E. Kewley, general sales manager of the national division of the incandescent lamp department, has been named acting manager to fill the vacancy. W. V. B. Van Dyck, as manager of the Schenectady office of the International General Electric Co., will assume all duties formerly carried on by the late M. A. Oudin.

Westinghouse Electric and Mfg. Co., East Pittsburgh, Penn., is constructing a central engineering laboratory and an addition to the present direct current power laboratory at East Pittsburgh at an expenditure of $1,500,000. The laboratory will be an 11-story structure 80 ft. wide and 225 ft. long. Six upper floors of the new building will be used for engineering offices and the remaining floors will house miscellaneous experimental work. Adjacent to this building will be the 125-ft. extension to the direct current laboratory.

Worthington Pump and Machinery Corp., New York City announces that its interests in the California territory will be served through the Worthington Machinery Corp. of California, Ltd., which will take over the sales and engineering staff and the warehouse facilities of the Worthington Co., Inc., in California. Headquarters will be at Los Angeles and San Francisco. H. D. Cornell, who has been president of the Worthington Machinery Corp. of Oklahoma, will be president of the new corporation and will move to California for that purpose. George W. Hawkins, formerly director of sales, will also go with Worthington-California as vice-president.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Buckets. No. 3 of "Bucket Pick-Ups" describing four different types of buckets in the Hayward line. THE HAYWARD CO., New York City.

Grinders. Completely illustrated bulletin on the new Eagle grinder with enclosed gears, run in oil. Full details and general dimensions. EAGLE IRON WORKS, Des Moines, Iowa.

Air Compressors. Bulletin **788** on vertical, single-cylinder, single-acting type air compressors, Type P-6. CHICAGO PNEUMATIC TOOL CO., New York City.

Water Wheels. Bulletin **W207** covering self-contained water wheel electric generating unit for low and medium heads—slow, medium and high speed. JAMES LEFFEL AND CO., Springfield, Ohio.

Weight Feeder. Bulletin **No. 33** describing constant weight feeder for feeding materials by weight. Weighs materials fed at a constant rate. HARDINGE CO., York, Penn.

Clamshell Buckets. Bulletin on new multi-power adjustable clamshell bucket of all-steel construction with few moving parts and large bearings. ERIE STEEL CONSTRUCTION CO., Erie, Penn.

Ready-Mixed Concrete Bodies. Bulletin **No. 65** outlining advantages of the Bartlett-Snow Movable V Concrete Body for transporting ready-mixed concrete and general haulage. THE C. O. BARTLETT AND SNOW CO., Cleveland, Ohio.

Portland Cement. "Making a Science of Fine Craftsmanship" is the title of an interesting folder on Lone Star portland cement and the International organization. INTERNATIONAL CEMENT CORP., New York City.

Boilers. Bulletin **BVM-1** illustrating and describing the VM-Type boiler (bent tube) designed especially for limited space conditions, particularly where the headroom is low. COMBUSTION ENGINEERING CORP., New York City.

Idlers. Folder covering demountable pulley Timken bearing idler, with malleable iron adjusting collar and brackets, coil spring bearing adjuster, rotating felt washer and other notable features. ROBINS CONVEYING BELT CO., New York City.

Electric Tools. Catalog **No. 20**, completely covering electric tools for production and maintenance in every industry. Excellently illustrated and giving complete specifications. THE BLACK AND DECKER MANUFACTURING CO., Towson, Md.

Crushers. Booklet describing Symons Cone Crushers for the crushing of gravel, limestone, granite, trap rock, ganister, dolomite, asbestos, slag, etc., in five sizes—2, 3, 4, 5½ and 7 ft., and equipped for either fine or coarse crushing. NORDBERG MFG. CO., Milwaukee, Wis.

Power Transmission. Booklet describing the Texrope Drive, a fully standardized and dependable means for transmitting power to industrial equipment with a reduction in speed from 1:1 up to 7:1 ratio. ALLIS-CHALMERS MFG. CO., Milwaukee, Wis.

Power Drive Equipment. Bearing Catalog **29-A** illustrating and describing the Flood Lubricated Oil Film Bearing in all styles of rigid and ball and socket mountings, adjustable four ways. THE HILL CLUTCH MACHINE AND FOUNDRY CO., Cleveland, Ohio.

Air Separating Unit. Bulletin **No. 25** covering laboratory air separating unit, embracing centrifugal separator and closed circuit collector, together with fan and universal motor operated from light socket. FEDERAL PNEUMATIC SYSTEMS, INC., Chicago, Ill.

Personal Protective Devices. Catalog **No. 29** describing complete line of Willson protective devices for the head, eyes, nose and throat. Products include a sandblast helmet, a "Dustite" respirator and various protective devices for the eyes. WILLSON PRODUCTS, INC., Reading, Penn.

Air Separators. Bulletin illustrating and describing the Raymond mechanical air separator, particularly adaptable for use with pulverizing mills which do not produce uniform finished materials. RAYMOND BROS. IMPACT PULVERIZER CO., Chicago, Ill.

Shovels. "One-Man Economy for Contracting and Industry" is the subject of an attractive two-color circular describing the new Trackson shovel and pointing out the advantages of this machine for excavating and other material-handling jobs. TRACKSON CO., Milwaukee, Wis.

Oxy-Acetylene Process. Eighty-page booklet entitled "Oxwelding Construction for Modern Piping Services," presenting facts pertinent to, and the advantages of, the oxy-acetylene process for the fabrication of steel and wrought-iron piping systems for all purposes. THE LINDE AIR PRODUCTS CO., New York City.

Excavators. Bulletin **No. 343**, covering Type 450, 1¼-cu. yd. excavators in electric, Diesel-electric and gas-electric powers. Bulletin **No. 339** on Type 450 steam machines, and a new bulletin illustrating and describing Type 490 electric heavy duty quarry or coal loading shovel. MARION STEAM SHOVEL CO., Marion, Ohio.

Commercial Lighting. A 28-page booklet, catalog **219-B**, covering lighting equipment for commercial interiors of any type. The booklet outlines the procedure for designing a lighting system and lists some of the more prominent Westinghouse installations. WESTINGHOUSE ELECTRIC AND MFG. CO., South Bend, Ind.

Speed Reducers. Catalog **No. 50** covering the complete line of Palmer-Bee speed reducers—herringbone, helical, worm and spur. Completely illustrated with tables of dimensions of the various reducers, horsepower ratings, and instructions governing installation and maintenance. PALMER-BEE CO., Detroit, Mich.

Boiler Plant Operation. "Test of Boiler No. 4, East River Station, the New York Edison Company," is the title of an article reprinted from the November, 1929, issue of *Combustion*, which is being distributed to interested parties by the COMBUSTION ENGINEERING CORP., New York City.

Air Compressors. Catalog **No. 800**, covering types "WN-24" and "WN-33" portable gas engine driven compressors, two-stage type, with displacements of 240 and 330 cu. ft., furnished equipped with either steel tired or solid rubber tired steel wheels, or without springs, axles, wheels and tongue for either skid or trailer mounting. NATIONAL BRAKE AND ELECTRIC CO., Milwaukee, Wis.

Diesel Industrial Engines. Bulletin **Nos. 1029Q, 1029R** and **1029S**, describing respectively the 4 cyl., 7x8½-in. engine; the 6 cyl., 7x8½-in. engine and the 6 cyl. 8x9½-in. and 9x10½-in. engines. Besides describing the engines mentioned, the bulletins contain valuable information regarding current Diesel practice. ATLAS IMPERIAL DIESEL ENGINE CO., Oakland, Calif.

Wagons and Light-Weight Rollers. Booklet describing Cat-Tread wagons, especially adapted for use on earth-moving operations where excavating and loading is done with power shovels or elevating graders—in 5- and 7-cu.yd. capacities. Also leaflet describing Davenport-Winchell roller for crushed stone drives, road building and general roller service. DAVENPORT LOCOMOTIVE AND MFG. CORP., Davenport, Iowa.

Arc Welders and Hand Starting Compensators. GEA-874E covering Type WD-200A arc welder, belt, motor or gas-engine drive—stationary or portable. **GEA-876D** on Type WD-400A arc welder, belt or motor drive—stationary or portable. **GEA-570B** on hand starting compensators, CR1034-K17, K22 and K37, dead-front cabinet type for squirrel-cage induction motors—two- and three-phase. GENERAL ELECTRIC CO., Schenectady, N. Y.